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ABSTRACT

The teacher's guide for the remedial text-workbook "Understanding Math" discusses instruction of the deaf student. An answer key for workbooks 1 and 2, a section with masters for transparencies to be used for games and activities and for teaching fractions, and two patterns for making geometric solids are included in the guide. For workbooks 1 and 2, see SE 015 827 and SE 015 828. (DT)

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STATE OF NEW JERSEY
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DIVISION OF VOCATIONAL EDUCATION

UNDERSTANDING MATH

TEACHERS GUIDE

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UNDERSTANDING MATH - TEACHERS GUIDE

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Introduction

The text-workbook "Understanding Math" was written expressly for use by the students of the Marie H. Katzenbach School for the Deaf. However, previous experience has shown that others in our field will obtain copies of this book and use it, hopefully to full advantage. For those of us with years of experience, or with specialized training for teaching the deaf, there is an appreciation of the complexity of the problem confronting the classroom teacher. We do recognize that there will be others to whom the deaf student is a first-time experience; for these perhaps a few words of explanation and introduction are necessary.

The power of deafness to isolate its victims and hinder their development is severely underestimated by most people. This is possible because, although deafness is a physical handicap, it is not a visible impairment nor one that evokes immediate or sympathetic reactions. Not that the deaf want sympathetic reaction; quite to the contrary. In fact, to avoid such feelings and to keep from revealing the severity of his affliction, human nature being what it is, the deaf person will react to situations in which he finds himself by attempting to conceal shortcomings in his educational and social development.

Of the many millions who suffer from a hearing loss, only perhaps 300,000 Americans can be classified as being severely or profoundly deaf. Of this number only a shade over one-tenth are of school age and as such require the services of a special program, class, or school. For each one of these students, language development and communications are severely affected to the point that in general they will operate three, four, and five years behind their chronological age educationally. The earlier the onset of deafness, the greater the deprivation. For all American deaf children, English is a second language, and unfortunately, unlike the foreigner to our shores, there is no formal language background to make concepts clearer.

Conceptualization – the understanding, if you will, of combining skills already understood to solve problems now confronting him – is a serious gap not easily overcome by the deaf student. He may attain a higher skill in computation because of rote learning, while basic reading and writing skills will be woefully inadequate. Therefore, when obliged to combine the reading of a problem and the application of a mathematical solution to that problem, your student may alternatively give up, blow up, or bluff his way through, depending upon how deeply his motivation has been affected by this devastating impairment--- and by you!

The authors of this text chose by design to make over half of it remedial in nature. The student we had in mind is a teenager who now must be able to apply whatever mathematical skills he posseses against the demands of a vocational trade in a practical sense. Our students and your students all possess the same strengths and mobility; they have average and better intelligence in the majority, and are truly anxious to learn. We do know also that they are confused, have experienced failure academically, and do not wish to appear inferior to either their classmates or to former or future pupils of yours. In short, they want to be accepted and respected as intelligent beings, but know that there are things they do not comprehend to their own satisfaction. Unlike the dangerous people who don't know what they don't know, your student does know what he doesn't know and needs your help to overcome this inadequacy and gain confidence.

To this end this text-workbook has been written. Since your students, because of their impairment, are forced to receive almost all of their information visually, visual intake has been emphasized. Because of previous academic failure, the activities are planned to assure early successes and create incentive for further efforts. Opportunity is given for the student to work from the concrete to the more abstract and verbal activities, as is needed by our students, and we urge you to accept the slower pace built in initially. And lastly, to overcome the lack of academic homogeneity found in classes of deaf students, we have created a semi-gimick by using the number "10."

In this way all the students start out with something they know (the number 10) and learn to apply it to situations in which at various times and levels they have had difficulty. We have attempted to make the book appear as a challenge and yet one easily overcome. We have also attempted to make the book appear as a friend and teacher by having it "talk" to the student. We, the authors, hope we have succeeded.

We have chosen to divide the book into two separate volumes, both for ease in handling and for psychological reasons. This should give the students more easily attained goals. For example, when the first two units have been completed . . . there's half of a textbook finished already! This sort of thing can be used to bolster the sense of successful achievement which will help to motivate the students onward.

On the pages of the book we have printed in boldface those words that we feel need clarification. The usual method here would be to discuss them as they arise; however, you might also wish to assign them as dictionary work or vocabulary words at a later time. Also, we would discourage the use of the book as strictly a workbook. To that end we have not provided reams of practice sheets. That's your job!

CHAPTER I – Addition

The teacher should prepare a **short** introduction on the importance of numbers and being accurate in their use. The concept here is to put across the point that numbers are used by everyone and in many different ways.

Take pages 1, 2, and 3 as a group. Suggest having class read page 1 and then discuss it in class, moving on to page 2 together. For page 2 the instructor could have 15 blocks, 15 small rubber balls, 15 corks, etc., so that the students get the concept of counting and ignoring the material they are counting. Prepare students for page 3 by grouping objects so they add groups, staying always below a total of 10.

Take pages 4 and 5 together. Have students tell you where the number 10 is used in daily living. Be sure that on page 5 the concept of "teen" numbers is clear in the student's mind, particularly the grouping of 10's.

Page 7 and 8 are taken together because the student must learn that the "zero" does represent a place or group.

Page 9 should be done in class and corrected in class. The importance here is that you will trust them to correct their own work, and for them to understand that **honest** correction will help them to discover their own weaknesses.

Page 10 can be assigned as homework – something "light" to do.

Pages 11, 12, and 13 are very important to correcting bad habits. Inevitably many mistakes can be traced back to inaccurate positioning of numbers in a column. Place masking tape on the blackboard as semipermanent column dividers for your work there.

Pages 14, 15, and 16 must be taught with all emphasis on group movement. This is a time to bring back the objects used on pages 1, 2, and 3. They must realize that only one digit can remain in a column answer, and the rest is carried and added to the next column. The authors have found this concept difficult to retain unless done repeatedly at

the "board" with the class providing the instructions. Then single out your students having problems and work individually with them. Page 17 should tie in easily at this time; then do page 18 in class, working with your weaker students.

Pages 19–25 provide the needed repetition and can be used as you see fit. Page 26 will challenge your faster student.

Page 27 provides you with the opportunity to show the student how smart he can be if he works at it. Show him that, by learning, he can show you only perfect papers each time. Make this phase important to him; build up his ego. Make it fun, make it easy, let him catch **you** making mistakes at the board. Of course, this is another way for the students to get further practice in adding without their realizing it! After all, they are just proving their work!

Pages 29–31 are used as you see fit. We would urge you to emphasize the proving method. Notice also that we have introduced decimal points without any fanfare.

Treat page 32 as a classroom quiz.

Page 33 can be taken "as is" or you can spend considerable time having students draw or cut out pictures to problems. Just be careful not to insult their intelligence.

On page 34, questions 1, 2 and 3 at the bottom are important. In each question the first sub-question is answered "yes" (and it would be a good time to point out that dimensions are **always** important no matter what the subject), but you are concentrating on those parts that provide the correct answer called for by the question.

Pages 35–38 have been divided into boy-girl interest.

CHAPTER II – Subtraction

The authors have found subtraction to be a quick study for our students. The problems arise from borrowing incorrectly or, as they sometimes do, turning the problem over so as to subtract easily! So treat pages 39, 40 and 41 as you like.

Take pages 42 and 43 together. Spend considerable time on the concept of removing a group of 10 from one column and adding it to another. Emphasize keeping the columns and places accurate. Move on to page 44.

Pages 45 and 46 should be taken separately. Spend as much time as you feel your class needs. Emphasis is on "proving" the work from this page on.

Pages 48 and 49 are extremely important, as students become confused as to what they are borrowing. We suggest repeated problems on the board, with class participation. Put masking tape on the board again to reinforce their recall.

Page 52 will either be very easy for your students or very hard. If it proves difficult, we again suggest repeated board work. Stay away from objects, as the sheer number of all the objects you will need in order to work with the "thousands" column will distract from your purpose.

Pages 53 - 58 use as you see fit; page 59 is a quiz.

CHAPTER III – Multiplication

This chapter will be one of the most important in the book. Without multiplication, your student will never divide nor work accurately with fractions and decimals. Like all other students, yours will have trouble with the higher ranges of the multiplication table. But unlike other students, your deaf student does not have the opportunity to reinforce or store his information through verbal practice. So the "table" will take considerable practice and a great deal of time to nail down. For this practice we suggest taking a few minutes each period for flash-card drill. Alternatively, you might place a number on the board and quickly place the number to be multiplied above it, call on a student, quickly get an answer and erase – moving quickly all the time. Work up a sweat – it will do you good and them too!

Pages 61 and 62 -- you should emphasize here the relationship between addition and multiplication. Considerable time should be spent on recognizing when to multiply and when you can NOT multiply.

Pages 63 - 66 are self explanatory. At first the slower students will have trouble with the trick for multiplying by 9, but the sharp ones will delight in it.

Page 67 -- here again considerable time should be devoted to the mechanics of carrying. The extra step is not difficult but you will find a tendency to add the number carried to the number being multiplied and then to multiply this total. You will have a chance to reinforce this concept on page 71 while you are dealing with the zero.

With page 74 it's time to get out your masking tape again and place it on the blackboard. Once again this will serve to demonstrate keeping numbers in their correct location. We would suggest several drills to be sure students appreciate the importance of this operation.

Pages 75 - 80 will give your pupils practice in what has been presented so far.

Page 81 may seem a little complicated at first but your students will enjoy this exercise and once it is learned will be impressed with themselves. Actually many feel that multiplication is too hard for them, and now they find themselves not only able to multiply, but even going one step further and proving their work. It is worthwhile to exhibit actual disdain with any number that is "10" or larger. Make a production out of changing to the sum of its number (ex: 36 = 3 + 6 = 9). This gives you a chance to restate the original concept of being able to do any mathematics if you can count to ten.

You will get additional reinforcement in using 10 on pages 87 and 88, where you teach them the simple way to multiply with 10, 100, and 1,000. When multiplying by a number like 203, stress how easy the zero makes the problem.

Pages 89 - 91 are computation work, but reading problems begin on page 92. Pages 96 and 97 have two "mystery" math puzzles to change the pace a bit.

CHAPTER IV – Division

We feel safe in saying that division is the toughest of the mathematic mechanics for your student. For some reason many, many deaf students find this to be beyond their reasoning. Your job is to change this attitude. It would help some to give examples of the use of division in everyday life. We have devoted considerable space to this area, but it all hinges on the understanding of division step by step. For this reason, we have introduced Divisor and Dividend into the vocabulary to help them keep the numbers in the correct position. (You might show the similarity between the word "divisor" and words like "actor," "teacher," "leader," etc. – the "or" and "er" meaning one that DOES the thing.) We also moved directly into comparing the divisor with the first number and then complicated this by introducing the necessity for comparing it with the first two numbers of the dividend. You may wish to spend a longer time on single-number dividends, but we have found this phase quite simple to put across. The difficulty as we see it, comes from comparing the larger number. Pages 98 - 106 follow this pattern.

On page 107 we introduce the remainder. If in discussion someone mentions that the remainder is a fraction, so be it. Otherwise we would not pursue the point at this time. Problems for remainders continue to page 113. On page 114 we discover carrying in division. Don't make it complicated and prolonged. The two pages (114 and 115) ought to make it clear enough.

Pages 118 and 119 bring us to the proving of our division. This should not present a big obstacle if kept low-keyed. Remember that division is a difficult concept for our students, so do not expect fantastic results.

The zero is introduced on pages 121 and 122. Again by making its presentation low keyed (zero comes mainly in two places) and simple, we can keep the student thinking in step-by-step procedures. From here to page 128 are all practice sheets.

Pages 129, 130 and 131 approach the problem of dealing with a divisor of two or more numbers. This will be extremely difficult unless you can put across the idea of comparing the first number in the divisor to the first one or two numbers in the dividend. Keep reminding the students that this is a clue, and that they should not expect to do as many problems as before. We expect that you will spend considerable time in explanation of this process. We gave five pages of practice; you may want to give much more.

On page 136 we again bring back old # 10 again to lighten up their load. Everybody will be successful on these, so it lifts everyone's spirits by working with large numbers. There is a quiz on page 143 and then we threw in two pages of tricks for fun.

CHAPTER V — Fractions

Fractions are, but needn't be, confusing. Because everyone has a problem relating fractions to being less than "1", give plenty of visual support with posters, toys and special items like wooden pies. By the way, a real live pie can help here too! (Corny but it works) Also, ask a woodshop boy to make you some blocks and other shapes, cut into common fractions.

Pages 146 - 153 cover most of the elementary efforts but page 154 introduces the improper fraction. Not too much of a problem here. In reality, life doesn't bring us too many improper fractions.

On page 157 we get into working with fractions. Here, using simple fractions, we get right into the addition, and then a page of practice. On page 159 we show subtraction and then a page of practice. More could be made of these if you feel it is necessary.

On page 161 you will encounter the difficult phase of fractions, that of locating the lowest common denominator. On page 162 we give the students some practice questions but suggest they be done in class so you are available to help. We would suggest a few minutes' drill daily on changing fractions before serious work is done on page 163. Work on page 164 the same way as page 162. This also would be a good time to review the multiplication table, for two reasons. First, to help them find the common number and secondly, to demonstrate relationships and importance of applying previous skills to present problems. You may have to demonstrate a few problems similar to those on page 164 so students will understand before starting. Page 165 will need similar help. Page 169 will also need some introduction. but in doing so stress that "N" could be anything ("X" or "?" or "Z" or anything). This exercise was meant to make them think.

Multiplication of fractions should move rather quickly. Cancellation can be taught as a game that makes problems easy and fun to do. You may want or need to do more in the way of practice work before teaching mixed numbers on page 173. Changing mixed numbers to improper fractions must be thoroughly understood before the students can cope with multiplying and dividing by mixed numbers.

Division of fractions begins on page 178. The two most important concepts here are the inverting of the divisor AND getting the divisor and dividend straight. We give examples of this second concept, but we are sure you will want to give additional emphasis to this point with many other examples. Stress should also be put on the word "of" as meaning multiplication, not division. Practice pages with various forms of dividing fractions will take you up to page 183.

On page 184 the mechanics of borrowing with mixed numbers is begun. Make use of the diagramming of the carrying or borrowing step, as it has proven to be successful in our teaching. The students need to follow step by step, particularly changing the "1" to the fractional equivalent needed. We would suggest considerable work be done on this phase prior to allowing the students to press on to the problems on page 186 - 193.

CHAPTER VI – Formulas

We know what you are going to say about this chapter: "If the student has so much trouble with regular math, why fool around with formulas!" Right? Well, we are giving you an opportunity to give to your students what they need -- repetition. After all, to work formulas you have to add, subtract, multiply, and divide; right? So now you can drill your people with repetitive work and they won't grumble, because they are doing "algebra". They have really arrived – doing math that college students do. A quick peek will tell you these are the simplest of formulas, but the kind some of your students will use everyday in their work. This chapter is strictly an ego-builder for your students. If

they are advanced, of course you will want the problems to become more difficult. But be very careful, for we designed this section to be another way of practicing their skills without becoming "bored".

CHAPTER VII – Decimals and Percents

In Chapter VII we swing back to the basic mathematic concepts again with an introduction to Decimals on page 214. The students should grasp the idea that decimals, like fractions, mean less than a whole thing. Many illustrations should be given, from the world of things and distances to dollars and cents. Page 216 discusses the places in the decimal-number word analogous to those in the whole-number world. This is a good place to review and clinch the concept of **place** as setting the value of a number.

On the next few pages we attack the problem of addition and subtraction of decimals. The main idea here, of course, is to oversimplify the method by informing the student that putting the points in line is the hardest thing he has to do. We encourage you to have the pupils put the points down first, then the numbers, then complete the problem. Work done in this manner on the blackboard by various students allows for drill work and retention by observation. Several pages of simple problems are included, and one page, 223, of more difficult ones.

On page 224 we tackle the problem of multiplication of decimals and, again, we try to de-emphasize the difficulty by having the student set up the problem, then complete it. When it comes to placing the decimal point into the answer, we have diagramed the movements for the student. At first flash this looks cumbersome to you, but the step-by-step procedure plus simplified counting has appeared to help our students greatly. Naturally, the better students should not be allowed to continue on this crutch, but the slower student may use it for quite a while. On the next page we use symbols instead of numbers, so the slower student may see the action a little more clearly. The next page, number 226, is a drill, and then page 227 introduces the addition of zeros to "pad-out" the answer to the proper decimal place.

On page 230 we introduce division with decimals. Here we break down the three forms of problems and then attack each type separately, followed by drill problems. We know that you will have to prepare more drill than what we offer. Again we have resorted to diagramming for the student to follow. As we said before, you can expect division to be a real stumbling block for your students, and having to worry about a decimal point will not make it any easier. The diagramming has helped our students become more accurate with the placement of the decimal points, but we can't swear that it improves the accuracy of their answers!

There is repetitive drill work on the basic forms of mathematics and the decimal through page 243.

Beginning with page 244, we take on percents. First we want to get across the idea that fractions, decimals, and percents are all **less than one**, and can all be converted from one form to another. The derivation of the % sign is given to stress the idea that percent is really a fraction with a denominator of 100. This enables us to have some drill in converting percents to fractions, which is a good way to handle the most common percents that students are likely to encounter. Still using fraction-conversions, we work out the most common type of problem, finding a certain percent of a number.

On page 248, we go on to the conversion of percents to decimals. We point out that the two little zeros in the percent sign can help students remember the two places to move the decimal point. We give them sample problems that are easier to work by decimal-conversion than by fraction-conversion. Then the students can work the problems on pages 249 and 250 by whichever method is easier for them. Page 251 gives the reverse process – changing decimals to percents.

Up to now, all the percent problems have been of the type "Find___% of___." Now we introduce another type: "What percent of___ is___?" To help the students see the difference, we use a little structure to fill in with what they know: (__% of ___ = __). In the one case, they multiply, and in the other case, they divide. We show them how to fill in the blanks, always stressing the word "of." The little formula relieves them of some of the thinking, and tells them what to do next. Practical problems will be taken up after the next topic.

We have intentionally omitted the third type of percent problem: If___ is___% of a number, find the number. We feel that this type of problem is not likely to be encountered in life, and makes a reasonably simple study into one of much greater difficulty.

Whenever demonstrating percent problems, always stress the need to convert percents to either decimals or fractions first.

On page number 254 we bring in fractions again; this time we tell the students how to change fractions to their decimal equivalents. If your students appear flustered by all this, just remind them that they have already learned how to divide, so it shouldn't be that hard. Ask your Metal Trades instructor if he can get you some decimal equivalent pocket cards or charts. Machinists carry these around with them continually. Which brings up a point. It's okay to ask your students to remember equivalents of ¼, ½, and ¾, but take a tip from the machinist and let them carry the rest around on their cards instead of their brains. If they learn how to convert, that's fine, and if they should have

to remember more conversions for their work, let their shop teacher work on that. Another thing – stay away from those unwieldy fractions that almost nobody ever has to work with in his daily life. These difficult problems cut the chances of your students' successes way down.

With page number 257 we bring in the percent with a fraction attached. We have attempted to teach this in various other locations within our math progression but it never has been a total success. We feel that at this point it fits well and should prove understandable. The difficulty here, of course, is the concept of how small a fraction of a percent really is compared to a standard fractional equivalent. One of the best ways is to compare a fraction of something to a percent of something, then show how small a fraction of a percent is in comparison to the original fraction. To help the student realize that this fraction in percents exists, spend some time discussing the latest in bank interest, special passbook interest, and mortgage rates in the area. Have them cut out ads from newspapers and build a bulletin- board display around percents and how they appear in our daily lives. It will be pretty hard for them to find a single day's newspaper without a fractional percentage featured in at least one ad.

The next few pages concentrate on problems with percents. We feel you will want to do more of them if your time permits.

CHAPTER VIII – Time

This chapter is based on an earlier work – a text book by one of the authors of this book. It may seem unnatural to include such a chapter in a book designed for basic concepts, and it may appear unrealistic for this to appear in a book to be used by teenage youngsters and young adults. But it has been our experience that "time," and particularly how to figure it, is a major gap in our students' knowledge. It has something, we suppose, to do with language, which, as we all know, is our particular students' major educational handicap.

The first seven pages are given over to a very basic approach to either inform or to strengthen the students' language-concept about time. This is followed by an equally simple quiz.

Pages number 272 and 273 are an attempt to help the student develop a way in which to set up a problem. As with decimals, we encourage them to put the time dots in line. One concept that you must work on is that 60 minutes equal one hour. Once a student can change a given **hourly** time to the **previous hour and 60 minutes,** you are home free! In fact, we take page 274 and work some more on this idea by showing the student that he must add an hour each time he subtracts 60 minutes. Remember, too, you are convincing him that he can add minutes without carrying over any numbers into the hours column. This can give some of your pupils real trouble, but keep stressing the separation of minutes from hours.

On pages number 275 and 276 we give the pupil two very simple "things to do" and then follow with a quiz on page number 277. From then on we finish up with problems, except for a brief two-page exploration of Roman numerals. Tie in the hand-signs that deaf students use – C for 100, M for 1,000. As with any student and his "language," the deaf are impressed that "their" language contains hand positions for symbols that came from as long ago as the Roman Empire.

Oh yes, ----- good luck!

ANSWER BOOK

CHAPTER I - ADDITION

Page

1 2 apples
1 car
6 cookies

3

1)	3	7)	9	13)	7	19)	9
2)	5	8)	7	14)	8	20)	9
3)	8	9)	6	15)	8	21)	9
4)	6	10)	9	16)	6	22)	8
5)	6	11)	8	17)	10	23)	9
6)	7	12)	8	18)	9	24)	8

4.

A. 4 7 9 10
B. 30 50 60 70 80 100
C. 110 130 140 160 170 190 200
D. 12:30 12:40 12:50
E. 12 14 15 16 19 20

8 2 4 8 7 9 8 3 0

9

5	5	8	8	9	6	9	3
8	9	7	8	9	7	1	4
5	2	7	6	6	9	3	4
2	7	6	10	10	7	8	10
10	9	5	7	10	8	8	9
9	6	9	10	9	10	10	9
10	12	8	11	10	9	12	8

11 68 59 58 88

12

77	96	69	79	98	155
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	174	166	183	142	170	173

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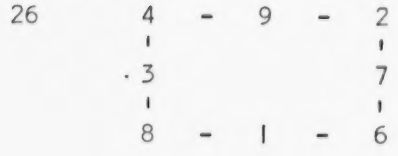


BOTH SEGMENTS ARE THE SAME.

29	120	122	153	105	116
	143	158	205	137	170
	2244	1990	1584	1456	2256
	290	186	220	240	296
	$2230	$2141	1201	$1173	$1942
	$6.25	$12.70	$115.70	$1.76	$15.02
30	1542	1299	1582	1970	1346
	2225	1330	1732	1569	1749
	$21.08	$2250	$21.35	$23.32	$1510
	$1719	$19.35	$27.90	$16.15	$2806
	1968	1424	$23.78	2232	$24.33

Page

31

2228	$22.80	$1961	$22.57	2304
2993	2938	2440	2823	2211
$21.74	$22.61	$16.61	$23.90	$21.85
$19.30	$12.30	$33.32	$28.05	$2811.50

32

19	21	17	11	21	18	15	19
30	79	90	60	101	65	93	
233	124	104	173	215	196	272	
823		624					
615		474					
1026	956	$8.91		$902.90			

35

1)	469.45	2)	121	3)	88	4)	2863.75
1)	277.50	2)	783	3)	180	4)	113

36

1236

45
78
125
188
272
381

37

1)	17	5)	8	
2)	$5.72	6)	$1.50	$2.25
3)	94¢	7)	$12.25	
4)	$14.61	8)	more	

38

1) 5,266.40
2) A. 390 cubic inches
   B. 300 horsepower
3) A. 13 strikes
   B. 17 balls
   C. 30 pitches

CHAPTER 11 - SUBTRACTION

Page

40

2	7	7
5	8	6
3	8	6
4	6	4
2	6	5
8	4	6
9	9	8
9	5	7

41

0	1	0	1	2	0	3	0
1	2	3	0	2	1	4	5
2	4	3	1	0	1	2	4
5	6	3	0	7	6	1	2
3	0	4	5	1	0	7	4
3	5	8	6	2	9	2	3
8	7	5	4	1	6	0	9
5	7	8	9	7	9	8	3
9	9	7	11	10	9		

44

39	27	7	9
13	19	26	16
33	47	16	13
19	19	15	18
79	28	58	45

45

16	19	28	25
10	15	5	3

47

18	18	17	24	39
27	17	34	17	37
28	19	15	18	48
49	25	18	29	29
7	18	38	38	25

50

19	46	29	39	19
138	104	129	138	118
61	74	75	63	41
72	78	49	59	187
1011	1766	3539	4422	
4513	4548	3987	2069	
	2057	2344		

Page				
51	1518	2987	4605	2286
	1435	9588	1540	4888
	26.49	30.77	27.46	22.75
	8.40	42.56	48.87	9.20
	68.45	88.58	75.70	195
53	118	618	328	534
	465	463	201	201
	225	135	102	331
	111	159	269	467
	106	338	566	768
	36.43	44.26	21.71	50.00
		194.51		
54	2863	1474	6569	3463
	3150	5716	3144	503
	6652	2172	1875	2155
	5182	2161	3249	1092
	1534	4881	3378	1839
	679	2087	1086	594
	1585	1903	1250	125
55	1759	3539	4422	4513
	4548	494.29	782.32	.53
	138.76	473.37	422.19	3.06
	432.92	350.74	437.65	4.50
	1.75	5.82	3.54	3.96
		189		
		111		
		415		
		182		
		.51		

56	1)	$11.20
	2)	$47.27
	3)	$.90
	4)	72"
	5)	145 lbs.
	6)	$54.23

Page 57

16 pts.

1) 8 2) 49 pts. 3) $1095 4) 9 5) $.89

1) $.89 2) 18 3) 2.51 4) 22 5) $1095

58

1) 2) 34 3) 961 4) $9.50 5) 6

1) $81.45 2) 5 3) 185 4) 19 5) $15.75

59

53	632	28	7.2
18	38	207	66
243	35	113	43
46	135	277	508
1047	1000	124	2223
160.37	37.38	3565.51	

MAGIC SQUARE

	1	
3	5	7
	9	

CHAPTER III - MULTIPLICATION

Page

63

1	2	3	4	5	6	7	8	9
2	4	6	8	10	12	14	16	18
3	6	9	12	15	18	21	24	27
4	8	12	16	20	24	28	32	36
5	10	15	20	25	30	35	40	45
6	12	18	24	30	36	42	48	54
7	14	21	28	35	42	49	56	63
8	16	24	32	40	48	56	64	72
9	18	27	36	45	54	63	72	81

64

6	3	4	12	21	10
3	10	20	2	18	21
9	14	24	24	12	12
28	12	2	15	16	5
16	1	4	6	24	14
18	16	6	8	15	8
4	24	20	27	32	18
18	28	36	32	27	36

65

36	56	45	32	21	36
49	35	72	48	42	40
30	63	64	81	56	25
42	35	45	24	72	54
40	63	28	32	48	24
54	21	27	56	63	48
42	64	72	63	54	56
36	35	72	45	54	81

66

10	16	8	12	6	14
18	2	9	16	25	12
15	20	18	24	35	30
40	21	28	24	32	27
36	45	5	7	4	8
3	6	9	1	36	42
49	48	56	54	63	64
72	81	4			

Page					
69	148	455	168	279	
	248	190	222	222	
	178	364	504	375	
	324	280	147	344	
	329	468	376	195	
	20		46		
	23		33		
		48			
70	140	414	177	423	244
	201	483	624	243	522
	210	736	612	448	658
	354	504	392	130	312
	440	216	203	112	160
	60		48		
	37		20		
		26			
73	250	360	490	640	810
	560	720	720	420	540
	3600	5656	6300	4400	5940
	4200	7840	4545	4045	5472
	5649	2436	4248	2525	7272
	5454	6160	2420	1254	2842
	3480	4950	3048	4690	2828
76	1312	6106	7548		
	16,836	173,633	293,280		
77	1176	1372	1875	915	2601
	7921	2112	3599	1564	5238
	5159	1290	1729	6776	1495
	1311	1610	2886	2808	4753
	7225	3478	4070	3237	1794
	4750	2204	6790	2170	2080
78	828	1254	3612	2788	4992
	4524	3990	3040	2037	2720
	940	3840	2475	1300	1776
	1008	1625	2814	6603	4836
	4266	4005	2948	624	3510
	1150	3081	2052	6424	1995

Page					
79	1710	2183	4032	2025	2881
	3160	2793	3430	1242	1728
	1672	2583	4095	2407	1410
	3040	4324	1624	2418	3600
	2850	1755	2160	1992	2952
	1280	1600	1950	1110	4240
80	3920	3344	1995	2880	6566
	3354	1225	2923	2052	6424
	7098	1647	2808	1860	1334
	630	666	3168	1786	6596
	1170	1140	3528	2010	1886
	2240	4680	4340	660	576
84	14,282	13,409	37,680	40,492	
	60,270	31,520	31,992	7141	
	31,042	21,590	35,144	27,435	
	48,546	37,056	60,480	25,002	
	41,256	18,590	25,632	28,380	
85	25,844	61,415	14,307	74,165	
	50,384	38,913	14,964	47,616	
	34,050	10,215	60,270	24,751	
	30,294	18,656	28,934	14,212	
	9512	11,505	25,392	12,540	
86	80,073	64,492	60,390	35,303	
	24,854	63,308	33,744	51,156	
	40,995	5472	24,535	60,367	
	20,400	36,518	13,838	18,270	
	21,714	19,532	14,027	6,981	
88	1250	3940	68,400		
	7,984,000	999,900	79,881,000		
	49,323	30,850	98,547	186,340	
89	148,470	29,848	143,276	142,464	
	90,068	75,684	113,280	105,280	
	221,235	110,316	205,568	263,900	
	129,162	491,340	32,500	174,592	
	203,548	200,688	103,008	259,985	

Page 90

276,996	101,625	164,226	146,601
100,920	164,243	71,688	115,050
189,571	25,900	95,645	144,550
29,600	93,548	128,780	121,728
118,625	219,604	149,940	210,840

91

1,305,630	5,000,577	2,876,790	1,814,050
1,416,204	4,493,200	2,448,420	5,080,064
236,250	1,186,040	1,485,000	494,877
1,732,912	2,309,996	2,064,480	2,077,348
2,545,400	1,063,447	2,207,232	1,139,400

92

	GIRLS	BOYS
1)	$6.00	6290
2)	$23.80	$23.80
3)	155	155
4)	$.90	$.90
5)	8	15

93

	BOYS	GIRLS
1)	107,000	432
2a)	$19.80	40,140
b)	$17.70	$43,752.60
c)	Less	80,280
3)	$14.00	$11.60

94

	BOYS	GIRLS
1)	10,960	$3.25
2)	44,100	720
3)	720	208
4)	9,300	1104
5)	2000	2065

95

1) 792
2) $134.64
3) $3000
4) 180
5) 2065

Page 97

1)	8	2)	8
3)	9	4)	9
5)	7	6)	3
7)	5	8)	9
9)	8	10)	3
11)	4	12)	5
13)	3	14)	3
15)	3	16)	5
17)	6	18)	9

EXTRA CREDIT PROBLEMS

A.
1) $268.56
2) $14,651.87
3) $2.37
4) $38 $95 $190
5) $367.50 $73.50

EXTRA CREDIT PROBLEMS (contd.)

B.
1) $2,182,530
2) $56,000
3) 14 hours
4) neither; broke even
5) 331/3 hrs. or 33 hrs. 20 minutes

C.
1) 400 cubic yards
2) $1,100
3) 30 cubic yards
4) 250 cubic feet

D.
1) $7.50
2) 4,800 lbs.
3) $155
4) $269
5) $350
6)

60	600	6000
890	8900	89,000
150	1500	15,000
23	230	2,300

E.
1) 144 3 points
2) Eagle's 39-yard line
Other team's 43-yard line
3) 8,100 sq. inches
4) 154 miles
5) 2,982 people

CHAPTER IV - DIVISION

Page 98	DIVISOR	DIVIDEND	
	DIVISOR	DIVIDEND	
	5	DIVIDEND	
	8	24	
	30	6	
101	8	4	8
	2	6	6
	4	6	5
	9	5	9
	5	8	2
	3	7	3
	5	3	2
	9	7	8
102	7	7	4
	4	6	2
	3	4	3
	2	2	4
	1	4	1
	8	8	3
	7	9	2
	6	3	4
103	7	8	2
	8	6	5
	2	3	8
	1	5	5
	4	7	7
	9	7	9
	6	9	5
	9	6	6
104	7	9	4
	4	8	6
	8	6	3
	4	7	8
	5	6	5
	9	8	5
	9	6	9
	3	7	7

Page			
106	21	44	24
	11	31	12
	13	11	10
	11	30	23
	12	42	10
	20	10	22
	22	23	22
	10	32	40
109	3 1/4	6 1/2	6 1/4
	3 2/3	2 4/5	7 2/3
	5 2/7	4 3/4	7 1/2
	4 2/9	9 1/2	5 1/4 or 5 2/8
	4 1/3	7 1/6	8 1/2 or 8 2/4
	4 1/4	6 4/5	4 1/6
	6 3/7	7 1/8	5 1/7
	5 1/3	2 1/3	5 1/2
110	5 2/3	8 1/2	3 3/4
	2 3/5	6 2/3	3 1/6
	3 2/7	4 2/3	2 1/4 or 2 2/8
	1 1/2 or 4 2/4	3 1/5	2 3/8
	8 1/4	3 1/2 or 3 3/6	5 5/7
	3 2/5	3 1/9	8 2/5
	7 1/3	4 2/3 or 4 4/6	5 3/4
	4 1/7	4 3/8	5 5/7
112	51	81	61
	72	51	124
	62	41	61
	51	63	81
	41	91	42
	81	21	52
	61	21	21
	21	91	32
113	31	71	31
	91	51	51
	423	91	91
	31	832	21
	31	912	91
	524	41	111
	614	512	31
	71	61	721

Page			
115	37	67	44
116	32	89	52
	89	45	63
	24	68	64
	34	26	45
	92	53 1/4	37 1/3 or 37 2/6
	27 1/8	23 2/7	35
	55 4/7	81 1/3 or 81 3/9	96 3/4
	46 1/9	46 2/3	35
117	16	97	55 2/3 or 55 4/6
	67	34 2/5	44
	81 7/9	37	28 1/6
	37 2/7	65 1/2	94 3/5
	56 4/5	94 1/3 or 94 2/6	28 1/7
	68 2/3	35 1/3	92 4/9
	73 6/7	49 3/8	34 3/4
	46 3/7	19	79 5/9

120	94 2/6 or 94 1/3	28 1/7	68 2/3
	35 1/3	92 4/9	73 6/7
	56 4/5	49 3/8	34 3/4
	46 3/7	19	79 5/9
	87 1/5	57	59 1/2
	46 3/6 or 46 1/2	51 4/8 or 51 1/2	78 1/5
	94	38 2/8 or 38 1/4	936 2/3
	385	486	572 2/5

123	70 1/3	30 3/5	20 3/4
	20 2/3	50 1/2	30 1/6
	70 4/9	80 7/8	40 2/4 or 40 1/2
	40 8/9	60 3/8	90 3/6 or 90 1/2
	50 4/5	40 3/7	90 2/3
	90 1/5	90 5/7	90 6/8 or 90 2/3
	70 5/6	80 1/4	80 4/9
	50 2/6 or 50 1/3	40 5/8	70 1/5

Page
124

50 3/8
50 1/4
90 6/8 or 90 3/4
70 5/7
203
100
50 3/8
33 1/3

120 3/4
80 5/8
60 1/6
70
50 1/6
90 2/7
84 1/6
40

201
50 6/7
90 8/9
90
80
60
66 2/8 or 66 1/4
12 6/7

Page
125

6 x 6	6 x 7	
36	42	
8 x 6	8 x 7	
48	56	
5 x 4	5 x 5	
20	25	
9 x 2	9 x 3	
18	27	
7 x 6	7 x 7	
42	49	
9 x 8	9 x 9	
72	81	
8 x 5	8 x 6	
40	48	

Page
126

7 x 7	7 x 8	
49	56	
9 x 7	9 x 8	
63	72	
8 x 4	8 x 5	
32	40	
6 x 8	6 x 9	
48	54	
9 x 8	9 x 9	
72	81	
8 x 4	8 x 5	
32	40	
9 x 9	9 x 10	
81	90	
4 x 7	4 x 8	
28	32	
7 x 9	7 x 10	
63	70	
6 x 9	6 x 10	
54	60	
8 x 7	8 x 8	
56	64	
9 x 8	9 x 9	
72	81	

Page 127

1) $12

2) 13

3) 269

4) 387

5) 6

1) $65

2A) $13\frac{1}{2}$ or $13.50

2B) $4\frac{1}{2}$ or $4.50

3) $93\frac{6}{8}$ or $93\frac{3}{4}$

4) 25

128

1) 8

2) 15

3) $5\frac{1}{3}'$ or 5'4"

4) 50,100

1) 157

2) 4

3) 450

4) $5\frac{1}{3}'$ or 5'4"

5) $15\frac{3}{5}$ or $15.60

131

14 $27\frac{1}{32}$

12 11
31 11
13 11
22 11
13 23

$23\frac{6}{42}$ or $23\frac{1}{7}$

12
22
23
11
21

132

11 14

21 45
62 48

$53\frac{1}{31}$ $56\frac{56}{91}$

$73\frac{17}{22}$ $46\frac{28}{41}$

$27\frac{1}{32}$

$46\frac{3}{41}$
94

$34\frac{2}{81}$

$68\frac{4}{31}$

Page 133

$62\frac{13}{21}$

$31\frac{7}{73}$

$74\frac{40}{42}$ or $74\frac{20}{21}$

38

$27\frac{54}{62}$ or $27\frac{27}{31}$

58

$84\frac{3}{82}$

$26\frac{14}{51}$

$28\frac{32}{73}$

$69\frac{40}{81}$

$24\frac{50}{52}$ or $24\frac{25}{26}$

$42\frac{13}{91}$ or $42\frac{1}{7}$

72

$74\frac{34}{42}$ or $74\frac{17}{21}$

39

134

$46\frac{24}{31}$

$86\frac{73}{83}$

77

92

$51\frac{73}{150}$

$62\frac{26}{52}$ or $62\frac{1}{2}$

$89\frac{33}{41}$

59

$38\frac{32}{92}$ or $38\frac{8}{23}$

$28\frac{80}{121}$

$69\frac{8}{23}$

$70\frac{15}{34}$

$26\frac{72}{82}$ or $26\frac{36}{41}$

$72\frac{70}{73}$

$27\frac{191}{200}$

135

$11\frac{67}{176}$

95

$4\frac{225}{852}$

$14\frac{94}{279}$

729

$43\frac{840}{900}$ or $43\frac{14}{15}$

$53\frac{92}{115}$

$4\frac{331}{617}$

$505\frac{71}{193}$

2898

136

$767\frac{9}{10}$

$35\frac{49}{100}$

$9830\frac{492}{1000}$ or $9830\frac{123}{250}$

Page

137

40
67

$9\frac{7}{10}$

$5\frac{4}{5}$

9

$4\frac{65}{100}$ or $4\frac{13}{20}$

$2\frac{83}{100}$

$76\frac{43}{100}$

$5\frac{600}{1000}$ or $5\frac{3}{5}$

$4\frac{576}{1000}$ or $4\frac{144}{250}$

56
$38\frac{9}{10}$

$36\frac{8}{10}$ or $36\frac{4}{5}$

$84\frac{6}{10}$ or $84\frac{3}{5}$

$8\frac{74}{100}$ or $8\frac{37}{50}$

$7\frac{50}{100}$ or $7\frac{1}{2}$

$3\frac{20}{100}$ or $3\frac{1}{5}$

$46\frac{50}{100}$ or $46\frac{1}{2}$

$5\frac{93}{1000}$

$44\frac{587}{1000}$

138

7
9
9
6
7
8

5 R 1

2 R 1

4 R 3

6 R 5

8
8
9
9
9
7

$3\frac{3}{4}$

$4\frac{3}{5}$

$7\frac{4}{9}$

$5\frac{2}{3}$

139

1) 15
2) 9
3) 299
4) 7
5) $208 - 200

1) 1204
2) 90
3) 6
4) 354
5) 18

Page

140

1) $36
2) 500
3) 1500
4) 580
5) $15

1) 24
2) $82
3) 413
4) 305

141

1) $15
2) 6
3) 4
4) 7
5) 24
6) 4

1) 800
2) $36
3) $82
4) 413

142

1) 305

2) $9\frac{1}{2}$

3) 15
4) $208 - $200

1) 354

2) 90

3) 18
4) 299

143

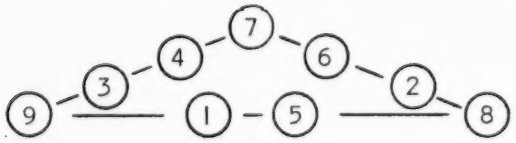
21 34
11 103
100 101
7 8
9 9
8 7
8 7
$649\frac{5}{7}$ 757
32 21

$76\frac{3}{31}$ $35\frac{3}{42}$ or $35\frac{1}{14}$

12 10
210 342
42 91

$141\frac{7}{10}$
43

144



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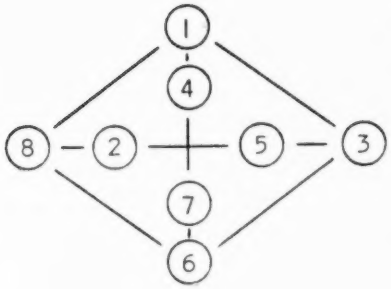


145

1)	52		9)	19
2)	67		10)	49
3)	72		11)	50
4)	15		12)	43
5)	8		13)	51
6)	13		14)	58
7)	3		15)	59
8)	12		16)	45

EXTRA CREDIT PROBLEMS

A
1) 57 hours 20 minutes
2a) 125 inches
2b) yes
3) 6 pieces
4) 13,575

B.
1) 26 miles per day
2) $49\frac{1}{3}$ miles per hour
3) 4.6 miles per minute
4) 16 miles per hour
5) 1,168.6 miles

C.
1) 17;11
2) Our team; 6; 5; Our team
3) $5.00; 4
4) $29.00

CHAPTER V - FRACTIONS

Page				
152	2	3	4	
153	2 = 1/5	2 = 1/6	3 = 1/3	4 = 1/3
	1/2	2/3	3/4	5/6
	1/2	1/5	1/3	2/5
	3/5	2/3	4/5	1/8
	1/2	1/4	5/8	1/9
	1/2	1/5	1/6	1/4
155	1 3/4			
	7 1/2			
	2 1/8			
	22 1/3			
	9			
	5 9/16			
	1 1/2			
	4 1/2			
156	1 1/4	1 1/6	1 1/8	1 4/7
	1 7/8	5	1 7/9	2
	4	3	2	2 2/5
	3	6	3 3/5	2 4/7
	1 1/5	2 2/3	1 1/2	1 1/2
	1 1/2	1 1/3	3 3/4	2 1/2
	2 1/4	5	4	3 1/3
158	2/2 = 1	2/4 = 1/2	4/8 = 1/2	3/3 = 1
	4/5	6/6 = 1	7/8	5/8
	5/4 = 1 1/4	6/6 = 1	9/6 = 1 1/2	5/5 = 1
	12/8 = 1 1/2	7/8	6/8 = 3/4	8/6 = 1 1/3
	11/8 = 1 3/8	8/8 = 1	12/9 = 1 1/3	14/12 = 1 1/6
160	1/4	1/4	1/2	1/3
	2/5	1/2	1/8	3/8
	4/5	1/3	1/4	1/6
	1/8	1/8	3/16	1/4
	4/9	1/9	7/12	11/12

Page

162

2/8	4/6	4/8
6/8	3/6	3/9
1/4	3/4	1/2
2/3	1/2	4/10
12/16	2/4	8/10
8/10 = 16/20	2/4 = 4/8	3/4
4/8 = 16/32	8/16 = 2/4	1/5
6/8 = 12/16	2/8 = 4/16	2/5
6/9 = 12/18	4/16 = 2/8	1/5

164

3/4	1/3	1/2
1/4	3/4	2/3
3/7	9/10	1/10
5/7	2/3	9/10
2/5	1/2	7/8
4/5	7/8	7/8
5/8	3/8	4/5
2/3	4/5	3/4
5/6	7/10	7/9
4/7	5/7	5/6
6/10	8/9	1/6

165

1/7	2/7	4/7	1/4	3/4	5/4
1/3	2/3	5/6	3/5	7/10	4/5
1/16	1/8	1/4	1/2	2/3	5/6
1/16	3/8	3/4	1/16	5/16	1/2
3/6	2/3	5/6	1/6	1/5	4/5
5/16	3/8	4/4	4/16	1/2	7/8
3/4	13/16	7/8	1/32	1/8	5/32
5/16	6/16	7/8	3/8	2/4	5/8
2/9	1/3	2/3	4/9	2/3	7/9
5/12	2/3	3/4	1/3	5/6	11/12

166

2/5	2/3	3/4
3/8	5/6	3/4
2/5	7/8	same
7/12	11/12	11/24
13/20	7/9	7/10

167

3/4	1/16	1/4	7/16
7/8	1/8	5/8	9/16
1/4	1/8	1/16	1/6
9/8 = 1 1/8	5/8	5/24	5/8
13/8 = 1 5/8	5/6	2/8 = 1/4	1/8
10/9 = 1 1/9	7/6 = 1 1/6	13/12 = 1 1/12	17/12 = 1 5/12

Page 168

1	1	1	1 1/3
3/4	1	1/8	1/2
1/12	5/8	3/8	1/4
1 1/2	11/16	1 1/4	1
1/2	1/4	1 3/16	13/16

169

2/2 = 1	1/3
6/8	4/10
4/4	1/4
3/3	10/4
3/4	2/4
3/4	8/8
8/16	3/4
4/4	5/16
2/8	18 3/4
15/16	9/16

171

3/8	1 1/2
1	1/6
2 1/4	1/30
7 7/8	5/9
2/3	7 1/2
1/72	1
2/5	1 7/8
1/2	6
4/27	5/27
1 3/4	2 2/5

Page 172

2/5	1/5	
1/4	1/20	
1/7	1/2	
3/16	1/2	
2/13	1/4	

174

14 7/8	2 1/4	3 1/4
3 7/8	12 7/8	14 5/8
8 1/16	7 7/8	1/8
3	15 11/16	10
10 2/3	7 5/8	3

175

14/5	7/4	10/3
3/2	14/3	21/2
65/8	23/4	93/10
25/2	11/10	35/3
20/3	61/4	27/2

Page		
177	5/8	21 2/3
	81	7
	7/15	9/16
	58	35
	1 1/8	47
	28 1/2	9 3/16
	1 13/32	7 7/8
	99	5 5/8
	26	1 5/8
	30	34

Page		
179	8/9	1/4
	4	1/32
	1	50
	8	2
	32	1/32

180	1/4	2/3
	9/160	1
	4	3
	3	3
	1	3
	3	1 1/3
	21 1/3	63
	28	1/20
	64	1/16
	1/64	1 1/2

			Page		
181	16		182	5	1 1/4
	48			15	10
	45			3 3/4	20
	16			10	5
	9			8	7
	128			17 1/2	10 2/3
	80			10	6
	54			24	18
	64			15	1
	70			12	49
	24				
	16				

			Page				
183	3 1/8	4	186	4 3/4	2 1/2	3 2/3
	11 1/3	17		1 5/8	2 2/5	1 15/16
	4	31		2 3/8	3/4	5 7/16
	5/8	2 5/8		3/8	3 7/12	17 5/8
	1 5/8	1 3/32		13	18 11/16	40 7/8
				8 4/9	14 7/9	4 3/4

Page 187

1 1/2
2 1/4
3/8
2
24

Page 188

1) 7/8
2) 4 4/5
3) 4 3/8
4) 7/8
5) 4 7/8
6) 5 1/8
7) 2 1/2
8) 3/8
9) 3/32
10) 4
11) 6 3/4
12) 1/8
13) 7 7/8
14) 46
15) 3 1/2

189

1/2
1/4
1 1/8

11/16
1/2
13/16

1 3/20
1/2
15/16

3/5
1/4
1 1/4

7/8
0

8/9
1/2

1) 12
2) 3
3) 18
4) 9

1) 16
2) 32
3) 8
4) 56
5) 44

Page 190

34 1/2
33 1/4
26
22 2/3
17 11/12
15 11/12
14 5/12
7 2/3
5

Page 191

1) 16 1/2 Tons
2) $7.50
3) 168 3/4 Miles
4) Yes
5) 8 3/4 Hours

1) 78 Feet
2) 5 1/2 x 6 1/2
3) 21 pieces, 4" left over
4) 120 Eggs
3 Eggs

192

1) 3/8
2) 12
3) 20
4) 32
5) 30

1) 40
2) 6
3) 4
4) 14
5) 5 7 1/2 10

Page 193

1) B
2) A
3) B
4) C
5) B
6) A
7) C
8) 1/2

EXTRA CREDIT PROBLEMS - FRACTIONS

A

1) 3 1/16"
2) No
3) 23/32"
4) 5 hours
5) 45"
6) 40 1/2"

B

1) 48' x 40'
2) $770
3) 28
4) 960 sq. ft.
5) $1,270

C
1) 3 1/2 cups
2) 1 3/4 pints
3) 1 3/8 yards
4) 1 1/2 yards
5) 30 members

D
1) 3 1/2 quarts
2) 1 3/8 yards
3) 1 3/4 pints
4) 1 1/2 lengths
5) 35 members

E
1) $2.25 $3.38 $5.63
2) $6.75
3) $13.50 $1.50 $3.00
$4.50
$22.50

F
1) $46.00
2) $85.25
3) The minor tune-up

G
1) $97.30
2) $730
3) $2,291.08
4) $8,333.33

H
1) $83.38
2) National League
3) $17
4) 3,264
5) $122.44

I

DOUBLED	HALVED
3 lbs.	3/4 lb.
1 lb.	1/4 lb.
3 cups	3/4 cup
8 eggs	2 eggs
1 1/2 cup	3/8 cup
1/2 tsp.	1/8 tsp.
2 tbsp.	1/2 tbsp.
2 tbsp.	1/2 tbsp.
2 1/2 tsp.	5/8 tsp.
1/2 tsp.	1/8 tsp.
1/2 cup	1/8 cup
1/4 cup	1/16 cup

J
1) 100 aprons
2) 10 2/3 tbsp. 16 tbsp. 8 tbsp.
3) 3,000 patients
4) $17

K
1) $40
2) 30
3) 30
4) $1.05
5) $60

L
1) $43.68
2) 63° 23°
3) $350
4) 2 21/64" 6 19/64"

M
1) 7
2) $9
3) 8
4) $12.24
5) $9.00

N
1) 48 lbs. 12 lbs.
2) 36 lbs.
3) 228 lbs.
4) $175.95 $113.85

O
1) $24.95
2) 464
3) 2 3/4 lbs.
4) 6 1/4 yds.
5) Yes

CHAPTER VI - FORMULAS

Page				Page		
198	1)	10	14	199	14	24
	2)	18	20		28	26
	3)	6	8		22	32
	4)	16	30		24	28

202	1)	16	36
	2)	64	100
	3)	225	400
	4)	1089	2304
	5)	3025	3844

Page			Page		
205	1)	4	206	6)	105
	2)	18		7)	90
	3)	20		8)	1600
	4)	7		9)	5214
	5)	40			

Page			Page			
207	10)	5133	211	1)	64	125
	11)	7276		2)	343	729
	12)	40,848		3)	1331	1728
				4)	3375	8000

212	1)	600 sq. in.	140 sq. in.
	2)	360 sq. in.	20 sq. yds.
	3)	$4,750.00	24 sq. ft.
	4)	432 sq. ft.	5 cu. in.
	5)	14 cu. yd.	30 cu. in.

EXTRA CREDIT PROBLEMS

A	1)	180 sq. ft.	B	1)	420 cu. ft.
	2)	12 sq. yds.		2)	4,480 cu. ft.
	3)	$72		3)	Yes
	4)	$24		4)	4' square
	5)	$6		5)	11,520 gallons

CHAPTER VII - DECIMALS AND PERCENTS

Page

215

10 3/10 | 25 19/100 | 46 21/100
100 38/100 | 44 123/1000 | 99 1/100
368 3/100 | 161 95/1000 | 204 999/1000
6 407/1000

217

$27.45 | $31.00 | $27.87 | $72.00
$19.98
$46.55
26.4
32.6
1.500
5.375

218

4.0	7.0	8.0	9.0	10.4	8.9
6.1	9.0	8.9	9.4	9.9	5.8
7.5	7.7	7.7	9.9	9.9	9.7
10.1	9.0	8.1	9.0	10.0	8.1
9.5	10.3	13.3	11.7	13.2	12.1
12.1	13.1	11.0	18.3	14.7	13.9
14.6	19.8	14.7	13.4	18.1	19.3

219

13.8	14.6	16.9	17.2	10.0	6.1
80.6	70.5	70.4	90.9	90.7	70.9
71.1	91.1	61.7	71.2	61.5	81.7
51.9	72.8	88.7	99.2	82.0	101.1
51.0	82.1	79.8	62.0	91.7	92.0
123.2	135.2	111.0	128.9	161.0	185.1
114.0					

220

$11.60 | $11.02 | $20.52
$43.05
4.6 gallons

221

4.0	1.0	1.0	7.0	5.0	2.0
1.0	4.0	5.2	2.2	6.3	1.7
2.9	1.2	3.6	2.1	5.6	1.2
1.2	4.3	4.2	6.0	1.1	4.0
2.0	3.0	3.4	1.3	6.1	4.5
2.7	1.1	4.1	1.4	2.1	2.6
3.3	8.9	6.1	2.6	5.5	7.3

Page

222

5.6	1.8	7.1	1.9	1.6	1.8
5.2	4.9	.2	6.5	5.7	2.9
1.9	2.9	.1	1.4	5.3	2.2
20.1	10.1	50.1	42.8	37.9	38.4
58.2	47.9	42.5	42.6	22.3	59.8
19.7	59.7	49.9	19.8	10.0	19.0
46.9	49.8	29.7	58.6	48.9	48.9

223

a) $46.75
b) 43.08

1)	.258	2)	1.31	3)	$18.59	4)	$127.95
5)	28.30	6)	5.31	7)	.0008	8)	6.3
9)	187.25	10)	512.4146	11)	847.63	12)	$117.75
13)	$4.25	14)	$2,649.95	15)	.500		

226

1)	.444	5)	9.60
2)	39.96	6)	65.800
3)	8.44	7)	.34375
4)	1.020	8)	1.4250

227

13.76	20.50	10.35	16.32	22.88	14.40
9.18	8.36	8.91	15.58	11.44	8.14
6.40	24.80	12.30	9.20	4.60	12.30
14.10	20.70	24.00	9.88	18.50	17.76
32.83	47.31	58.56	62.32	43.12	37.83
67.76	72.00	17.67	56.32	57.42	76.23
63.70	7.02	87.22	57.96	76.63	18.81

228

65.10	74.70	61.60	44.10	98.01	61.60
.726	1.058	151.2	131.2	272.0	207.0
258.0	196.0	29.24	.924	.1014	24.96
25.16	129.6	284.2	2.673	.1242	863.3
864.11	1185.92	81.395	105.075	1358.50	547.76
111.146	792.96	139.763	450.80	26020.8	3805.23

Page					
229	.09500 .0750		.050 .0260	.087 .0981	
230	2.06		.40	.061	
231	.14 4.3 .25 .65 .006 41.9		.7 1.6 .30 .73 1/3 3.24 7.29	.12 .35 .125 1.18 .0562 .388 1/2	.24 .3
232	200		20.1	300.5	
233	.08 2.1 3.1 .81 6.1 .42 9.0	.041 6.2 .92 4.1 111 4.1 1.10	.061 9.1 .31 .71 1.11 102 3.1	.061 6.1 2.1 32.2 .70 51 1.11	.102 9.1 9.1 4.2 .71 7.1 9.1
234	1.0 2.0 3.00 20 1.30 110	2.0 20 2.00 .030 2.28 1.3	20 2.0 20 20.0 2.10 1.1	3.0 40 200 .40 22.0 23.0	30 200 20 3.0 110 31.0
235	1.4 4.9 3.75 80 27.5		41.9 .049 3.6 25 46.2		38 6.76 .65 6.0 3.8
236	220		200		20

Page 237

200	5700	430
380	360	20
350	1180	30
7830		

Page 238

4.25	8.75	

Page 239

2.15	4.8	5.38
12.75	.00362	20.5
2050	.205	180
1500	36.3	3.62

Page 240

1.101	15.9	.028
1.5984	9.143	1312.50
.099	.06	17.06
58.2	32.65	157.4
9.1	.97250	.069
19.189	89.470	.1356

Page 241

300.33	30.954	23.407
20.593	$1.15	49.431
12.486	4.3	2.56
.0256	.096	.025
14.697	.8556	8.16
930	42.861	.0091

Page 242

.7488	143.98	64.9
2.112	.25	227.46
42.84	12.8	93.0
.80639	8.1	4.816
67.536	2030	52.6257

Page 243

$247.00
$70.00
$49.91
$5.71
$6.93
$5.75
$3.66

Page 245

1/10	3/10
1/2	3/4
1/20	9/50
63/100	9/10
1/25	49/50
1/100	49/100

Page 247

10	$8
100	9
$5	135
9	20
$1/2 or 50¢	33

Page 249

A)	.15	.37	.04
	.95	.62	.10
	.08	.03	.13
B)	9	$10.08	35
	100	91.35	1.47
	$120	126.50	110
	162	$223.20	450

Page 250

1) $18 $54
2) 20 5
3) 96
4) 243 207
5) 31
6) 20.80
7) $14.40 $3.31 $11.09

Page 251

50% 36% 7% 88%
25% 90% 99% 100%
6% 2% 20% 16%
44% 75% 1% 125%

253

A
.54 1.60
2 100
2.88 9

B
5%
50%
30%
5%
16%

256

.75 .20
.625 .50
.875 .125
.333 .125

8.25 2.25
430 900
10.10 2.375
43.50 1.90
437.50 5.375

257

A.
.055 .1025
.155 .0475
.90125 .1033
.2525 .025
.0333 .0666

Page 258

B.
$8.25
1.95
$19
$2,125
2 1/2%

Page 259

1) $.90 18%
2) $.50 22%
3) 12 1/2%
4) 5%
5) $275,000

Page 260

1) 25% off
2) $2,500 25%
3) $2,155.50 $1,796.25
4) 3,000 60'

Page 261

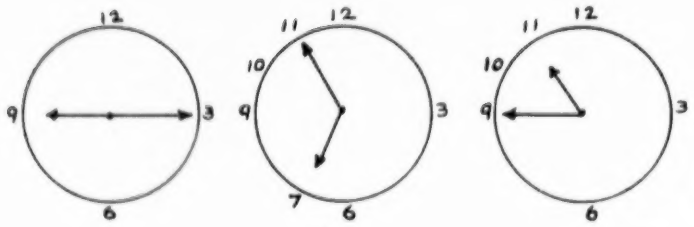
20%
30 1/2%
16%
14%
7%
4%
$364 91%
$36 9%

Page 262

$145.00
$130.50
$ 69.60
$ 58.00
$ 52.20
$ 46.40
$ 43.50
$ 34.80
TOTAL 100% $580.00

CHAPTER VII - TIME

Page
269 4:10 9:35 7:30



271

1) 15
2) 30
3) 60
4) Morning
5) PM
6)

7)

8)

9)

10)

11)

277

1) 12:00 to 12:00
2) 12:00
3) 4 hours
4) 6 hours 5 minutes
5) 8 hours 45 minutes
6) 8 hours 45 minutes
   8 hours 15 minutes
7) 11 hours 40 minutes

279

5 hours 45 minutes
5 " 20 "
8 " 30 "
6 " 30 "
9 " 11 "

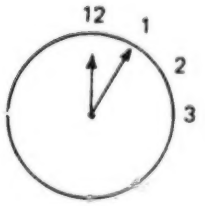
7 hours 55 minutes
7 " 45 "
5 " 40 "
10 " 10 "
11 " 40 "

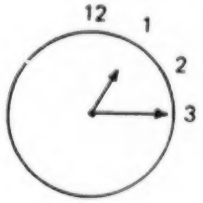
8:00 to 4:15 8 hours 15 minutes
6:10 to 4:50 10 hours 40 minutes

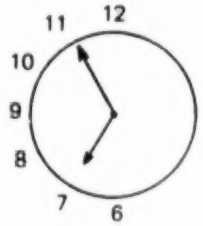
Page 280

3:35 to 8:55 is 5 hours 20 minutes
5:05 to 7:00 is 1 hour 55 minutes

281 12:30 to 5:40 is 5 hours 10 minutes







282
1) $14.00
2) $62.40
3) $63.83
4) $84.00
5) $756.80

Page 283
1) 3:00
2) 5:45
3) 36 minutes
4) 1:30
1:55

284
1) 1 hour 30 minutes
2) 4:25
3) 6:05
4) 3:30
2:50

Page 285
1) 55 minutes
2) 11:51
3) 52 minutes
1:22

286
1) 45 minutes
2) 1 hour
3) $3.06
4) 6:23 P.M.

Page 287
1) $88.00
2) $35.20
3) $4400
4) $350
5) 130 chairs
6) $4550

288
1) $271.18
2) $49.00
3) $1,500 $7,500
4) $1,466,400

Page 291

1)	1	2	4
4)	6	5	7
7)	9	11	10
10)	12	8	3
13)	20	11	13
16)	12	21	19
19)	18	17	22
22)	15	16	24
25)	30	37	23
28)	32	31	34
31)	27	25	26
34)	39	14	33
37)	29	35	27
40)	28	26	24
43)	13	38	31
46)	29	32	36
49)	I	V	X
52)	II	XX	XXX
55)	III	VIII	XVIII
58)	IV	IX	XIX
61)	VI	XI	XVI

Notes on Transparencies

In the following sections I and II, you will find masters for transparencies to be used in conjunction with the overhead projector.

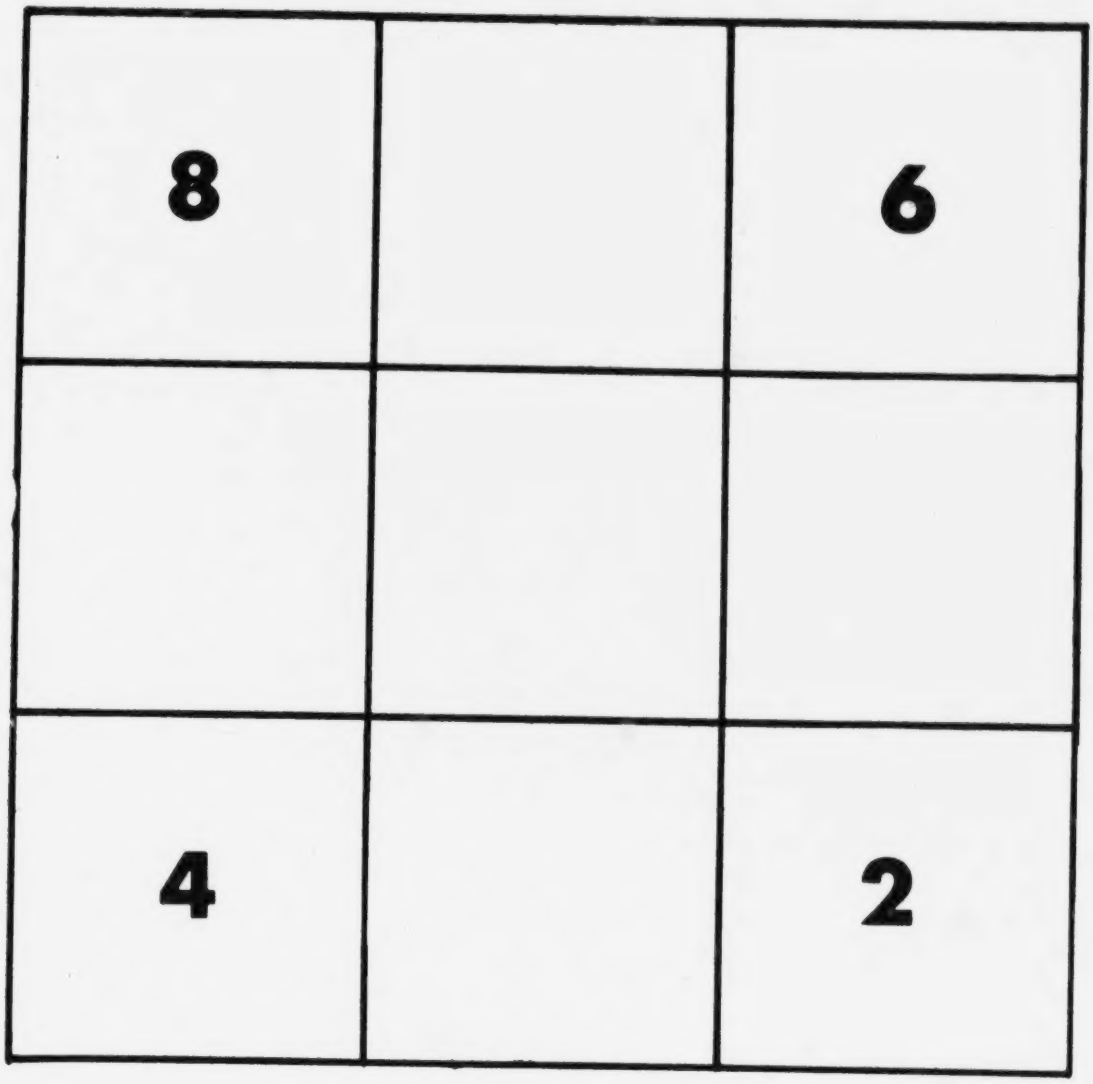
Section I includes games and activities that students may perform on the chalkboard. The pages lettered from A to J are the masters for the main body of the transparency. The sheets that immediately follow them (Labeled A-O, B-O, etc.) are to be used as overlays; these may be cut into sections where appropriate and taped to the main body of the transparency. Thus, when the student has completed the problem, the overlay may be flipped over to check the answer.

Section II includes masters for teaching fractions. The pages lettered A, B, C, D, E, and F are used as the main body of the transparency. The pages that immediately follow them are to be used as overlays to provide answers for the students. The transparencies are used in the following manner: cut each overlay into sections, as indicated by the lines (e.g., into 2 rectangles, or 4, or 8, etc.). Fasten the sections by flexible tape to the edges of the projectual frame. Then any number of them can be flipped over into place to get the desired fraction.

The instructor asks a student to shade, for example, $\frac{3}{16}$ of the whole unit on sixteenths presented to him. After he has completed the shading on the chalkboard, three of the 16 overlays may be flipped over on the projectual to check the answer.

SECTION I

MAGIC SQUARE



Fill in this "magic square" so that each row and each of the columns adds up to a total of 15.

1

3 5 7

9

Fill in this addition chart by adding the number from Column A to the numbers in the top row. (A few samples have been completed to show you how.)

A	0	1	2	3	4	5	6	7	8	9	10
0	0										
1											
2											
3					7						
4											
5											
6											
7						12					
8											
9											
10								17			

	1	2	3	4	5	6	7	8	9	10
1	2	3	4	5	6	7	8	9	10	11
2	3	4	5	6	7	8	9	10	11	12
3	4	5	6		8	9	10	11	12	13
4	5	6	7	8	9	10	11	12	13	14
5	6	7	8	9	10	11	12	13	14	15
6	7	8	9	10	11	12	13	14	15	16
7	8	9	10	11		13	14	15	16	17
8	9	10	11	12	13	14	15	16	17	18
9	10	11	12	13	14	15	16	17	18	19
10	11	12	13	14	15	16		18	19	20

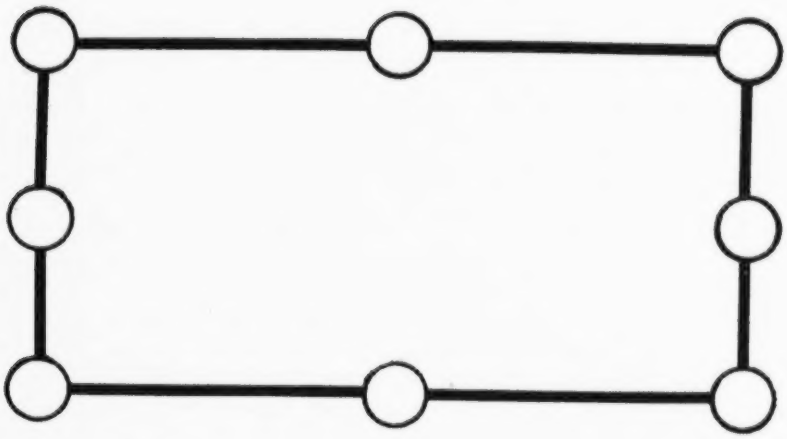
MINIMUM STOPPING DISTANCES

MINIMUM STOPPING DISTANCES AT DIFFERENT SPEEDS			
M.P.H.	REACTION TIME DISTANCE	BRAKING DISTANCE	TOTAL STOPPING DISTANCE
10	11 FEET	9 FEET	20 FEET
20	22	23	
30	33	45	
40	44	81	
50	55	133	
60	66	206	
70	77	304	

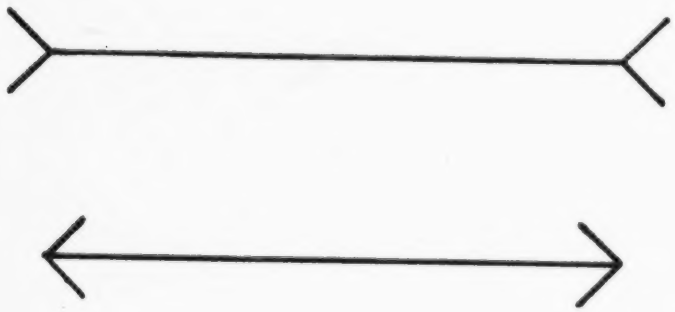
Add the second and third columns to find the total stopping distances.

45 FEET
78 FEET
125 FEET
188 FEET
272 FEET
381 FEET

D



Place the numbers 1, 2, 3, 4, 5, 6, 7, 8, in the circles so that the three numbers on each side add up to the same amount.



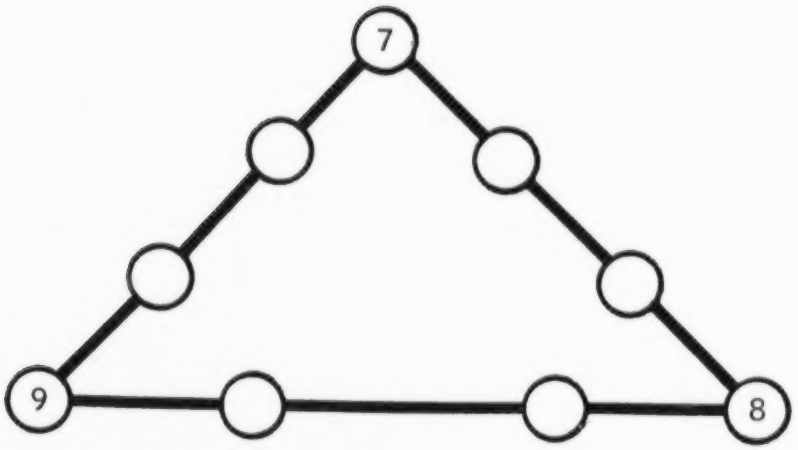
Which of these two lines is longer?

4 9 2

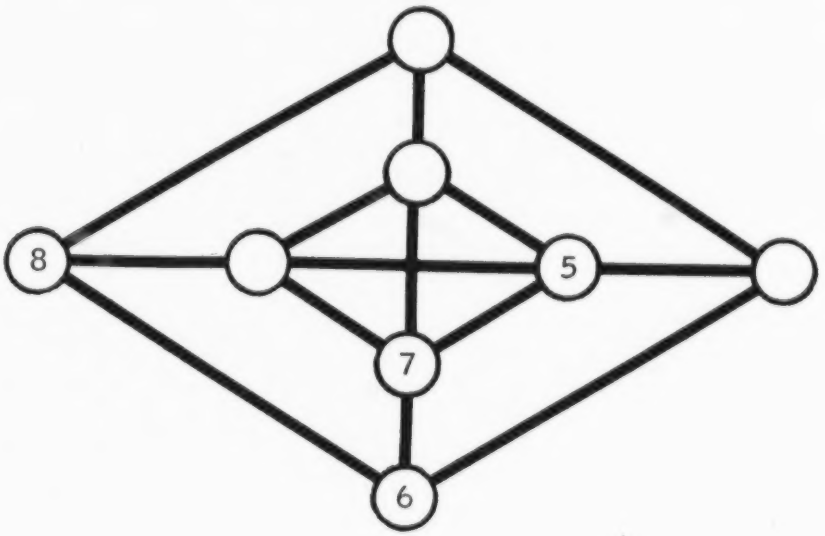
3 7

8 1 6

BOTH ARE THE SAME



Place numbers from 1-6 in the circles so that no matter which way you add around the triangle, the answer will be 23. Do not use the same number twice.



Place numbers from 1-4 in the circles so that no matter which way you add, around the circles, or up and down, or across, your answer will be 18. Do not use the same number twice.

4 6

3 2

1 5

1

4

2 3

F

Would you like to relax a little? Good, try this puzzle for fun.

The answer for each question has a dot in front of it. Find the dot that goes with each answer. Start with the dot that goes with your answer to # 1 and draw a **straight** line to the dot for the answer to # 2. Then draw a line from the dot for # 2 to the dot for # 3, and so on until you have completed a picture.

1. $2\overline{)104}$ =
2. 60 + 3 + 4 =
3. 6 x 12 =
4. $2\overline{)30}$ =
5. (2 x 5) - 2 =
6. one more than 12 =
7. 100 - 97 =
8. 3 x 4 =
9. (3 x 5) + 4 =
10. 56 - 7 =
11. 10 + 10 + 10 + 20 =
12. $10\overline{)430}$ =
13. 3 x 17 =
14. 23 + 35 =
15. $100\overline{)5900}$ =
16. (65 - 30) + 10 =

.1 .2 .3 .4 .5 .6 .7 .8

.9 .10 .11 .12 .13 .14 .15 .16

.17 .18 .19 .20 .21 .22 .23 .24

.25 .26 .27 .28 .29 .30 .31 .32

.33 .34 .35 .36 .37 .38 .39 .40

.41 .42 .43 .44 .45 .46 .47 .48

.49 .50 .51 .52 .53 .54 .55 .56

.57 .58 .59 .60 .61 .62 .63 .64

.65 .66 .67 .68 .69 .70 .71 .72

52

67

72

15

8

13

3

12

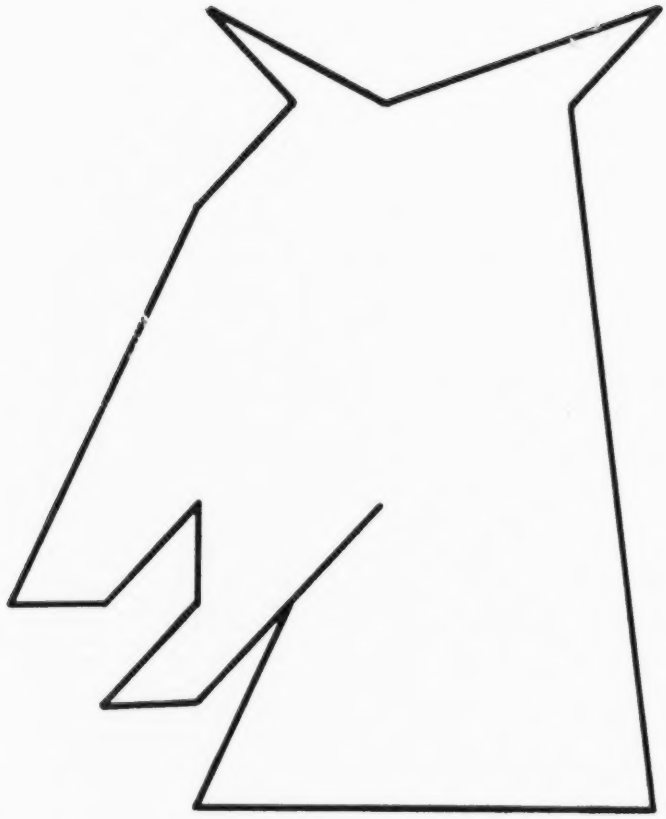
19

49

50

43

51



58

59

45

YARD GOODS INVENTORY

G

DATE	AMOUNT USED	BALANCE
		37 yards
	$2\frac{1}{2}$ yards	
	$1\frac{1}{4}$ yards	
	$7\frac{1}{4}$ yards	
	$3\frac{1}{3}$ yards	
	$4\frac{3}{4}$ yards	
	2 yards	
	$1\frac{1}{2}$ yards	
	$6\frac{3}{4}$ yards	
	$2\frac{2}{3}$ yards	

$34\frac{1}{2}$ yards

$33\frac{1}{4}$ yards

26 yards

$22\frac{2}{3}$ yards

$17\frac{11}{12}$ yards

$15\frac{11}{12}$ yards

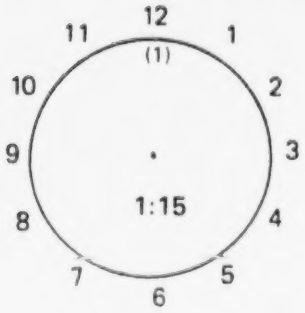
$14\frac{5}{12}$ yards

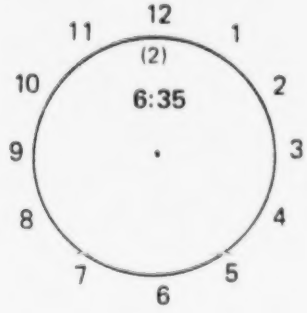
$7\frac{2}{3}$ yards

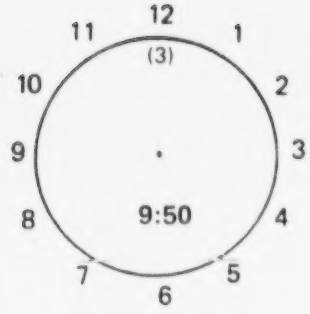
5 yards

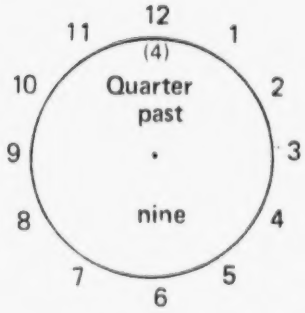
PROBLEMS

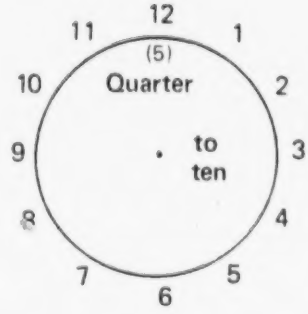
Draw "hands" on these clock faces to show the time.

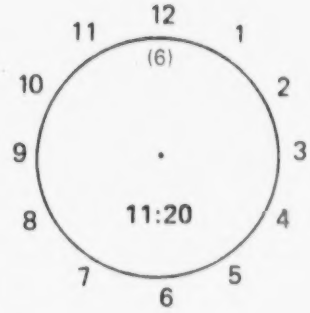


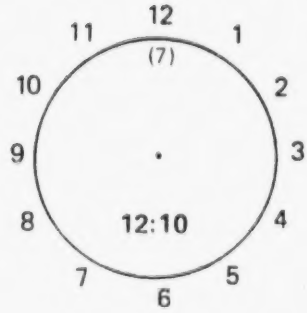


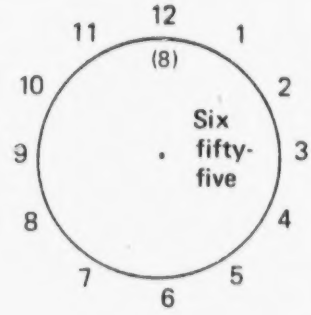


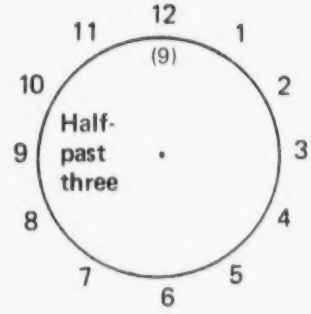


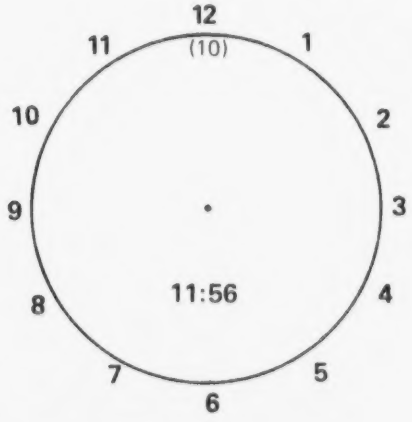


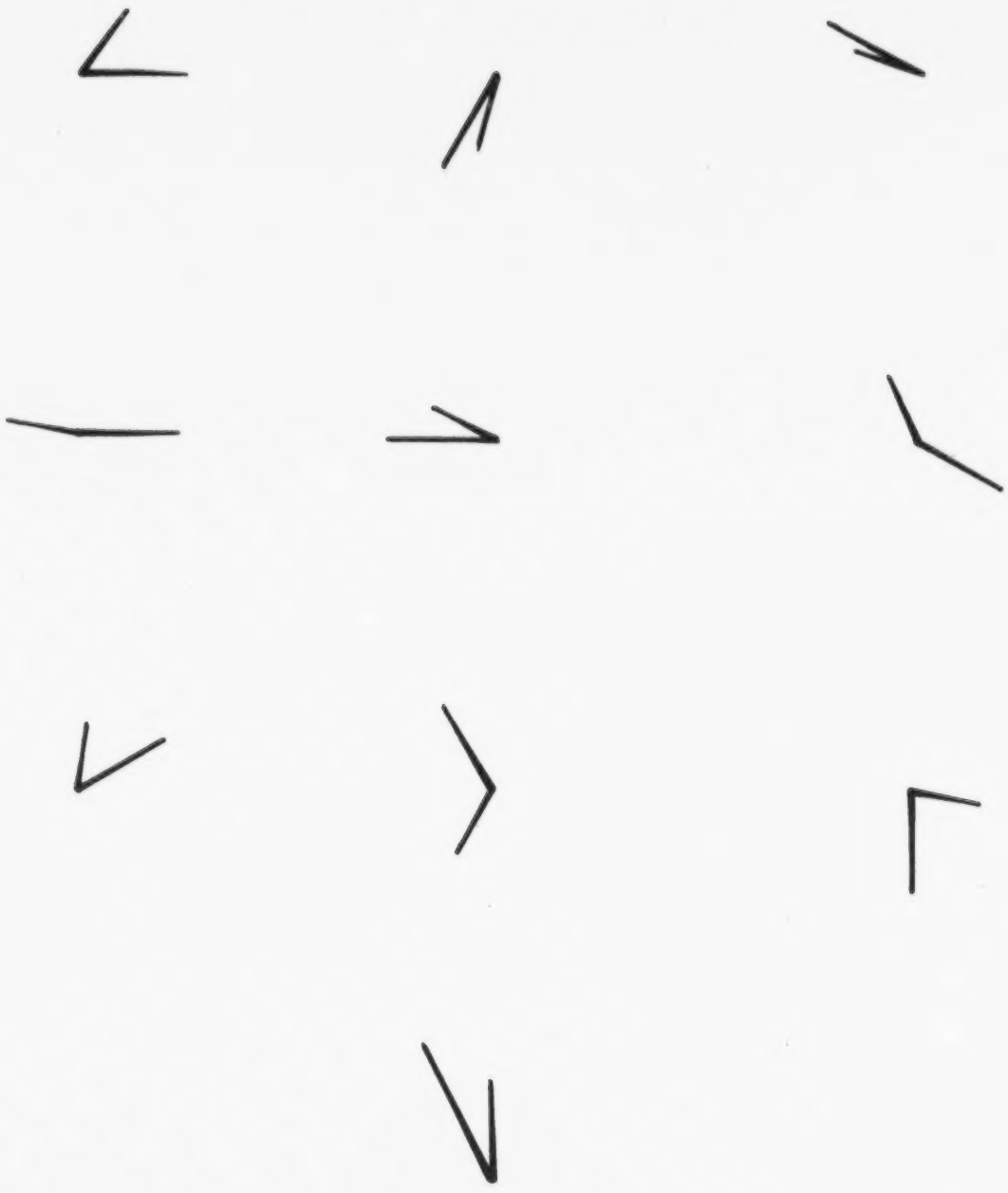








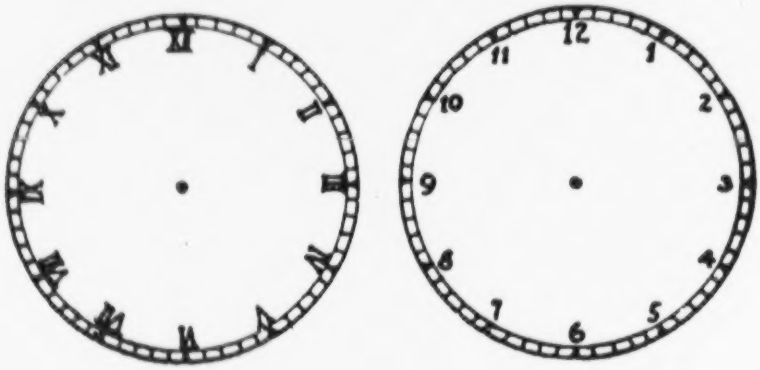




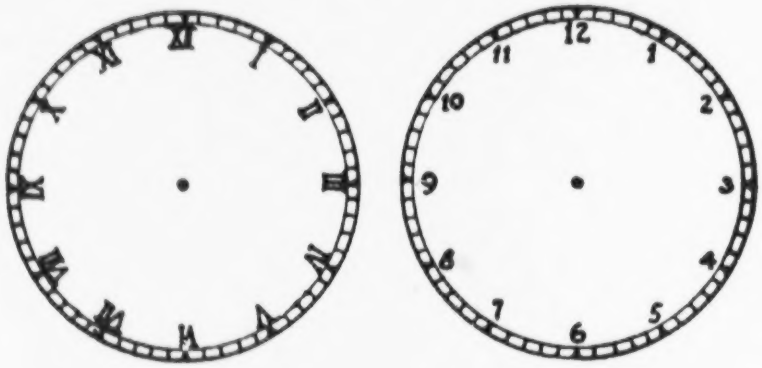
PROBLEMS

Draw "hands" on the clock faces to show the times listed below:

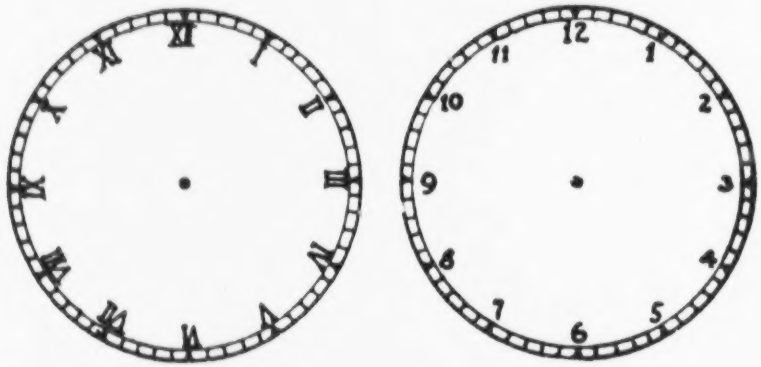
9:15



7:30



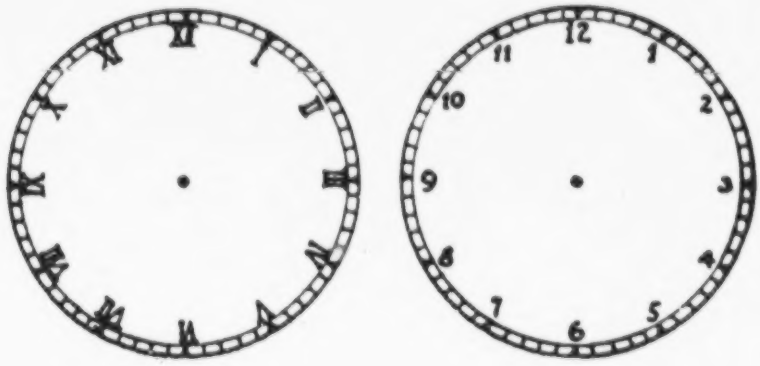
3:20



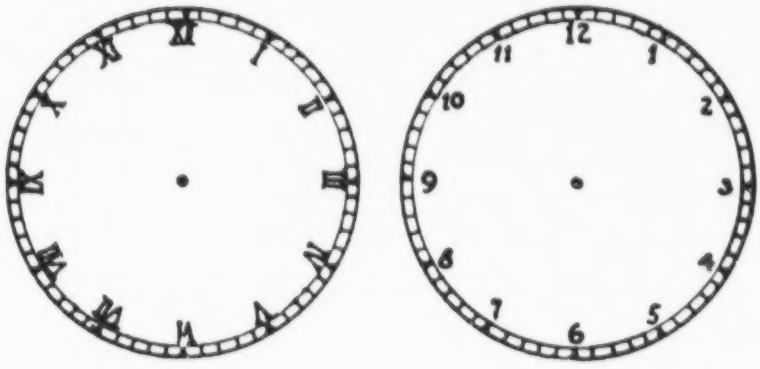
PROBLEMS

Draw "hands" on the clock faces to show the time listed below:

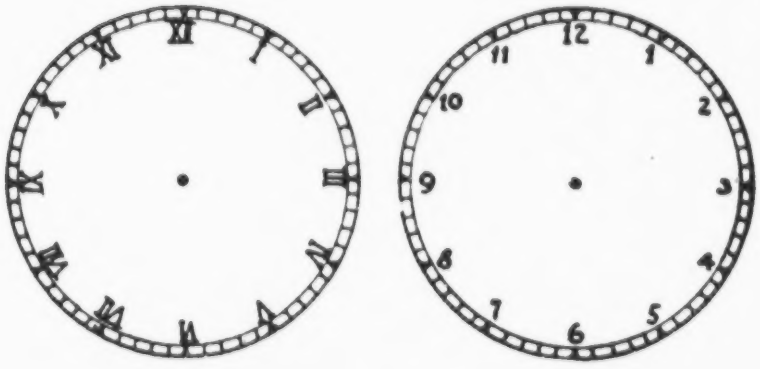
1:45



12:17

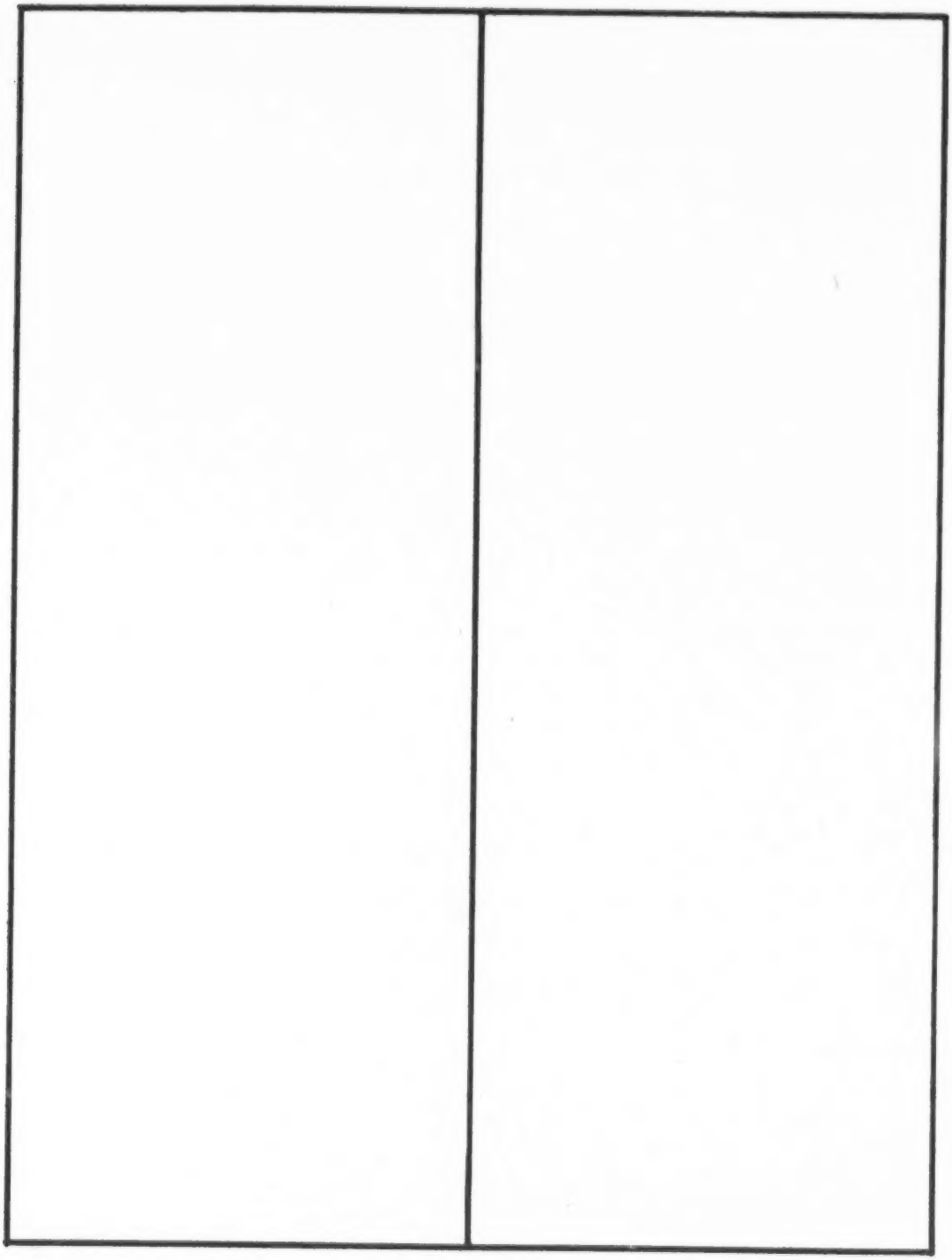


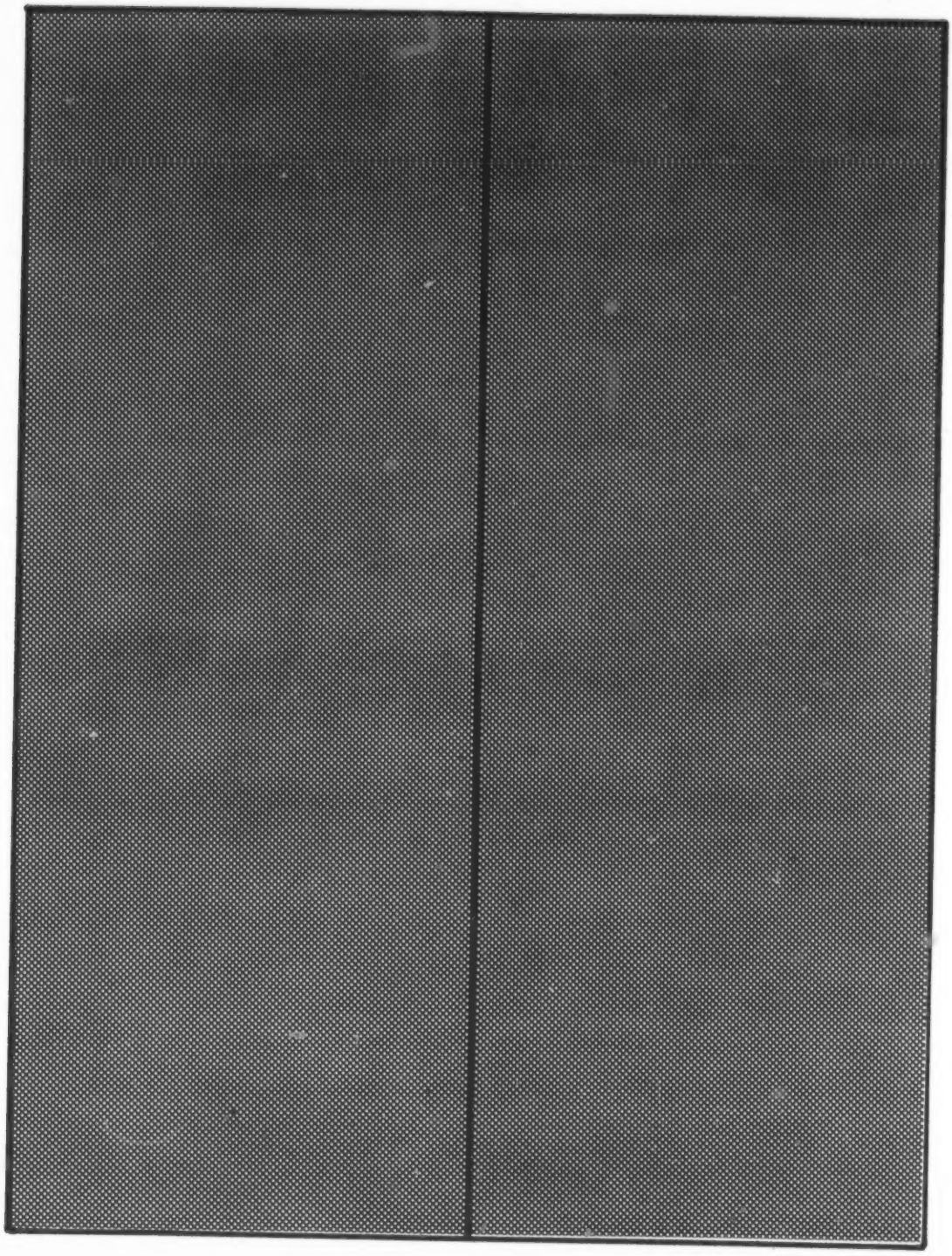
8:43

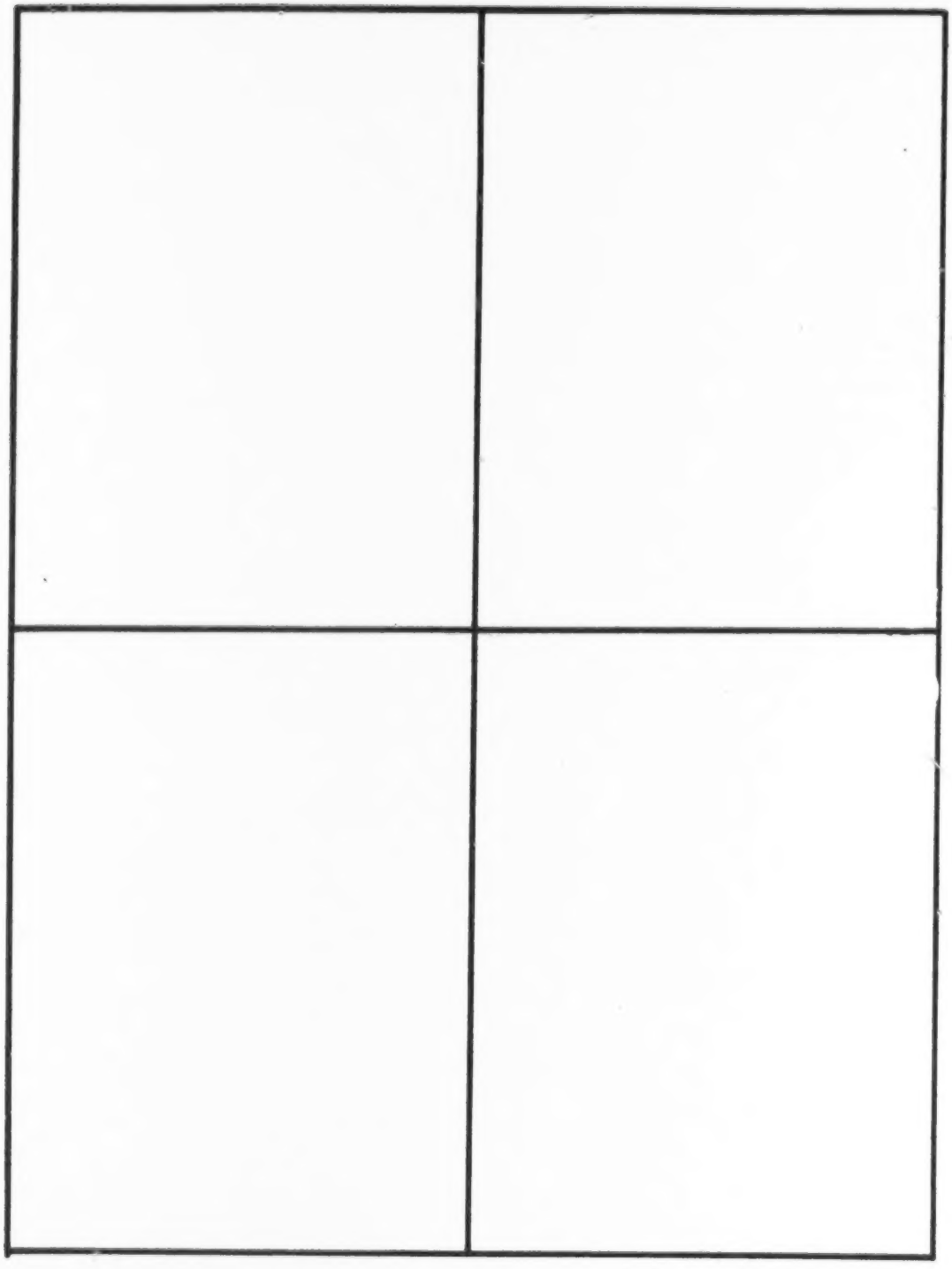


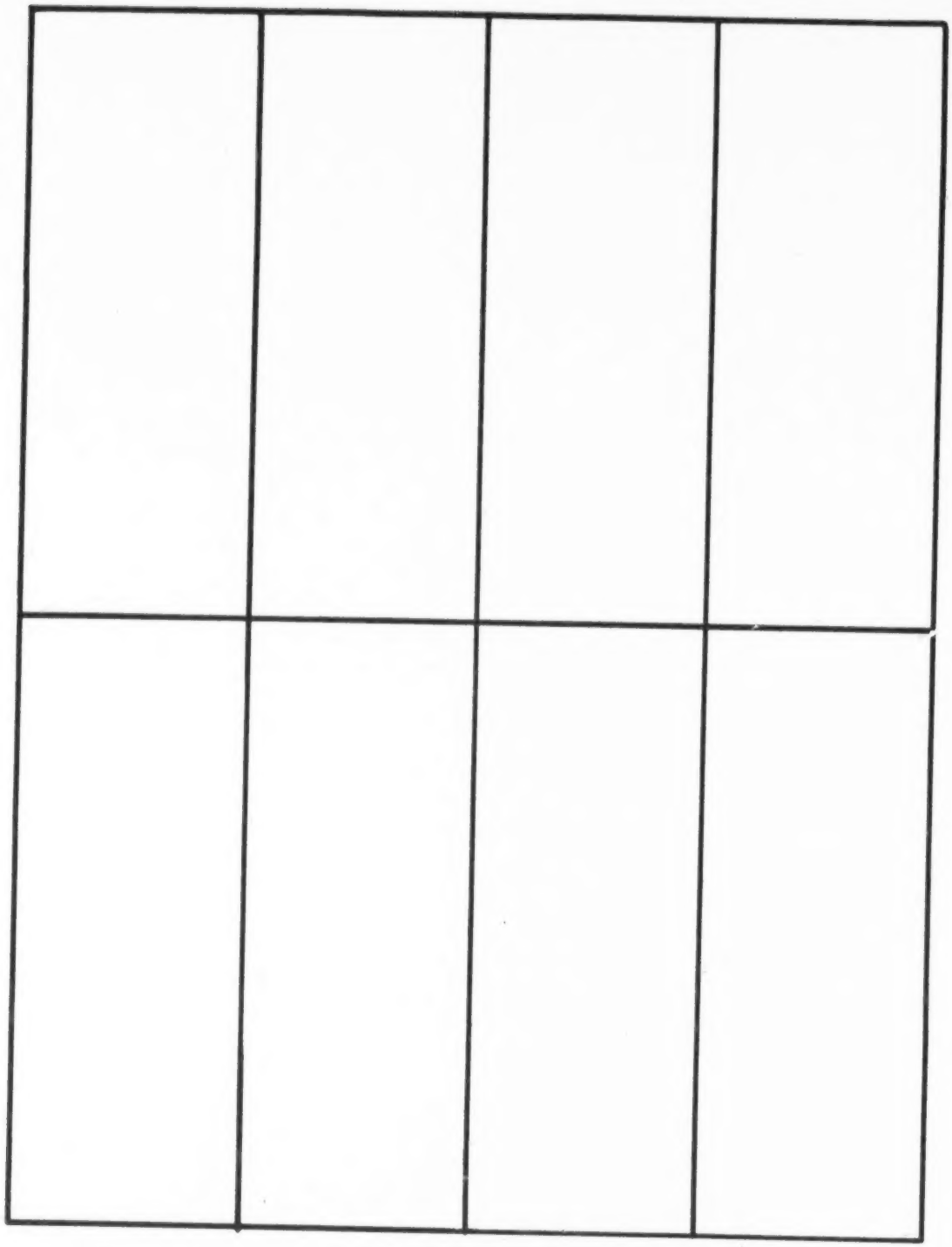
SECTION II

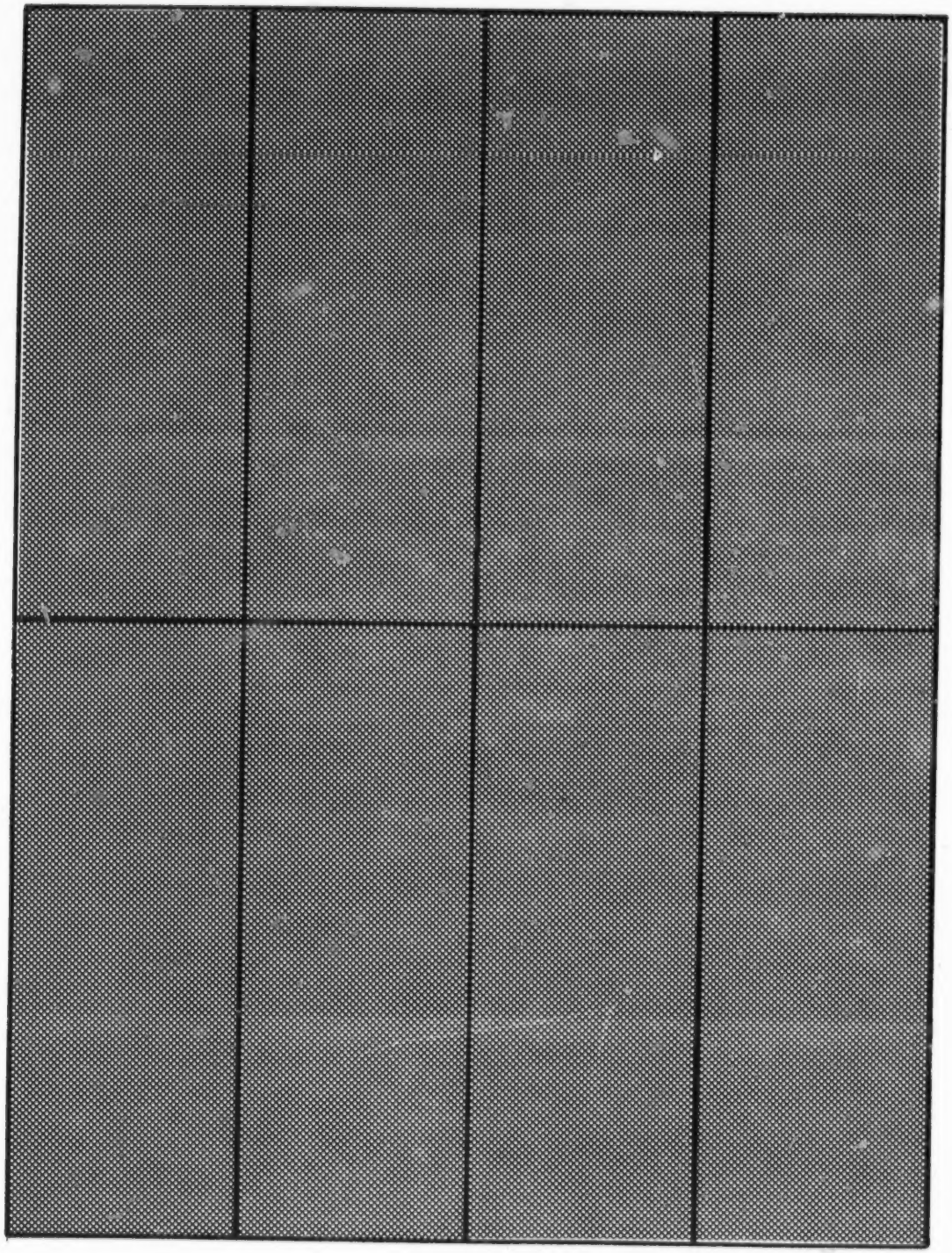
A



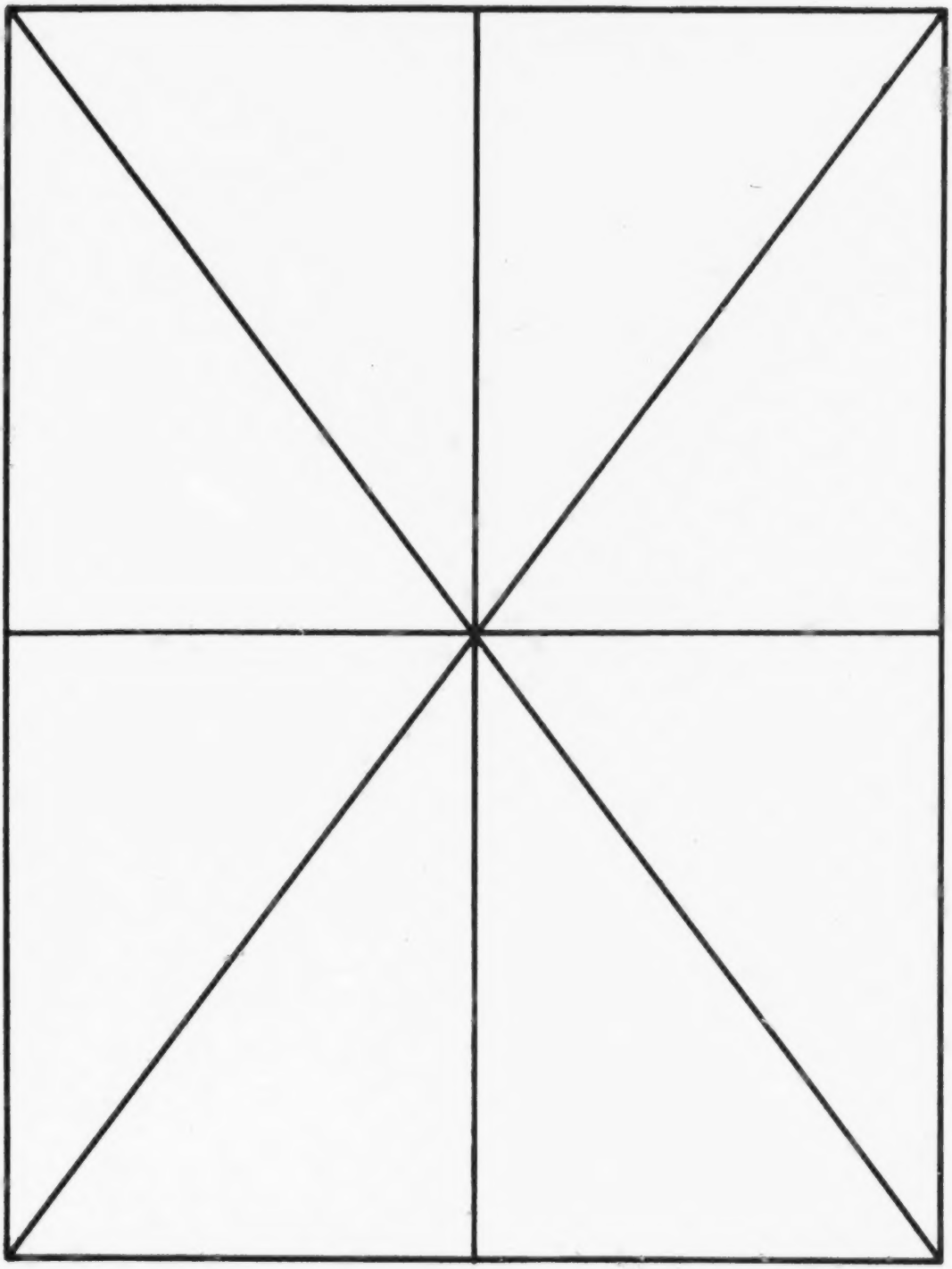


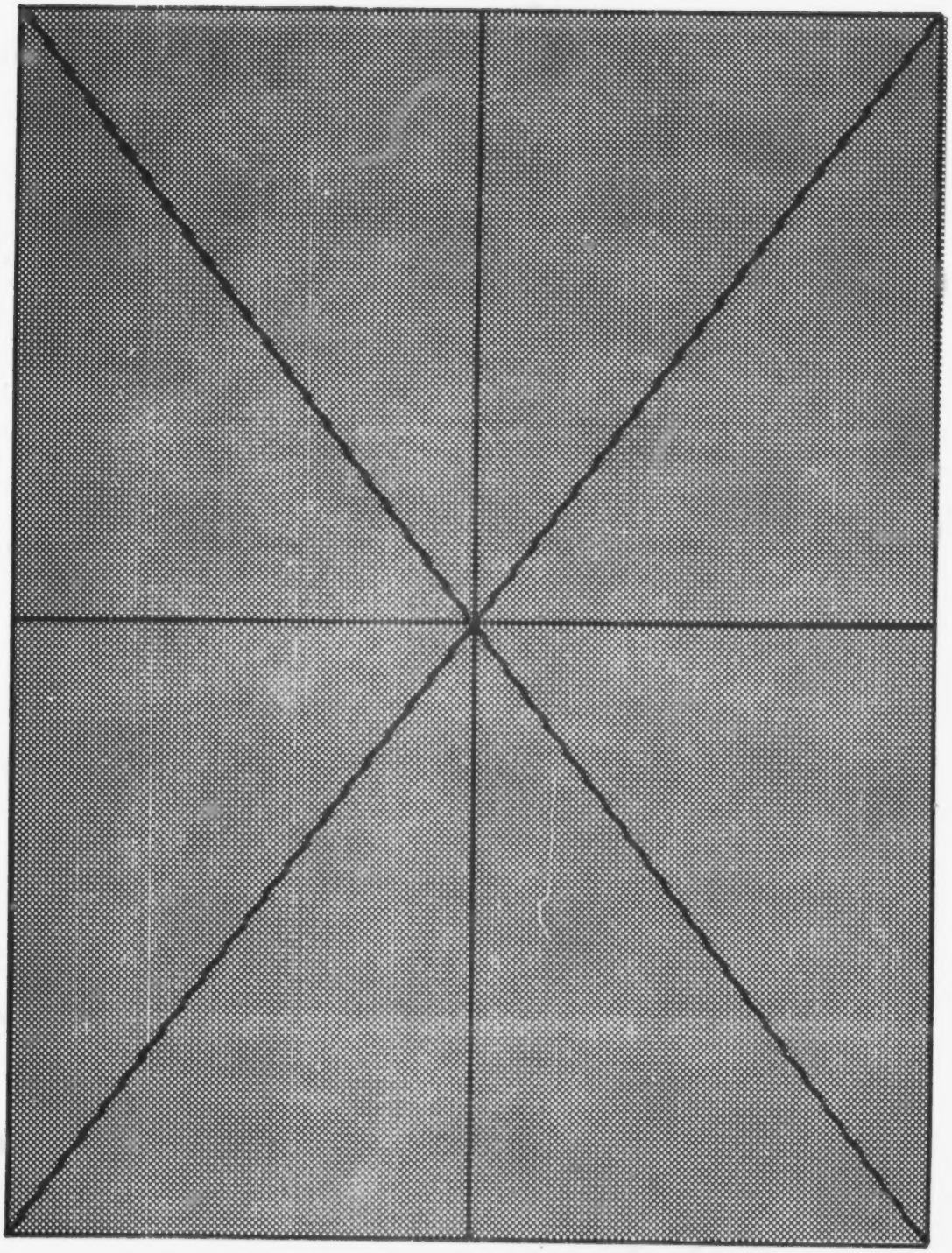




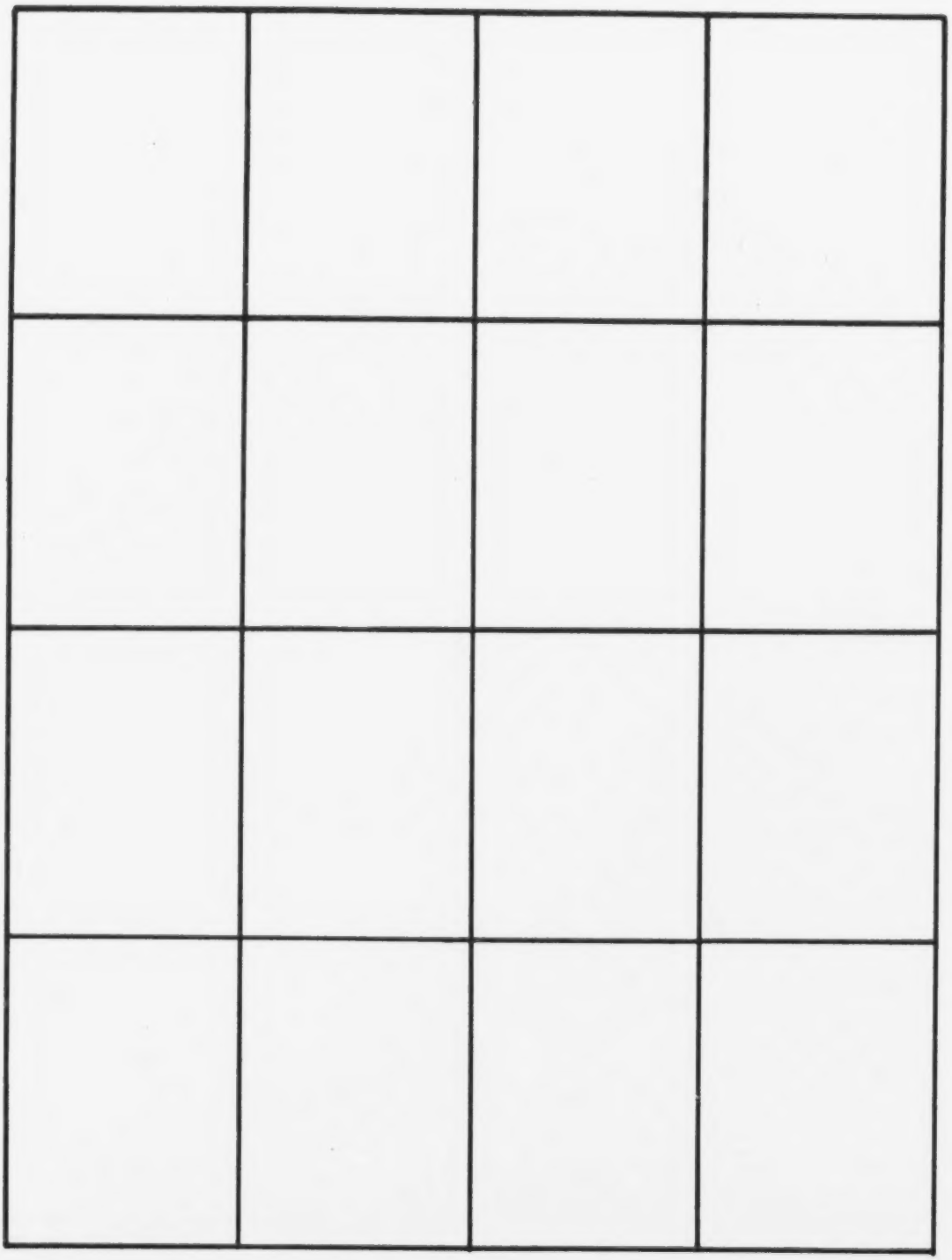


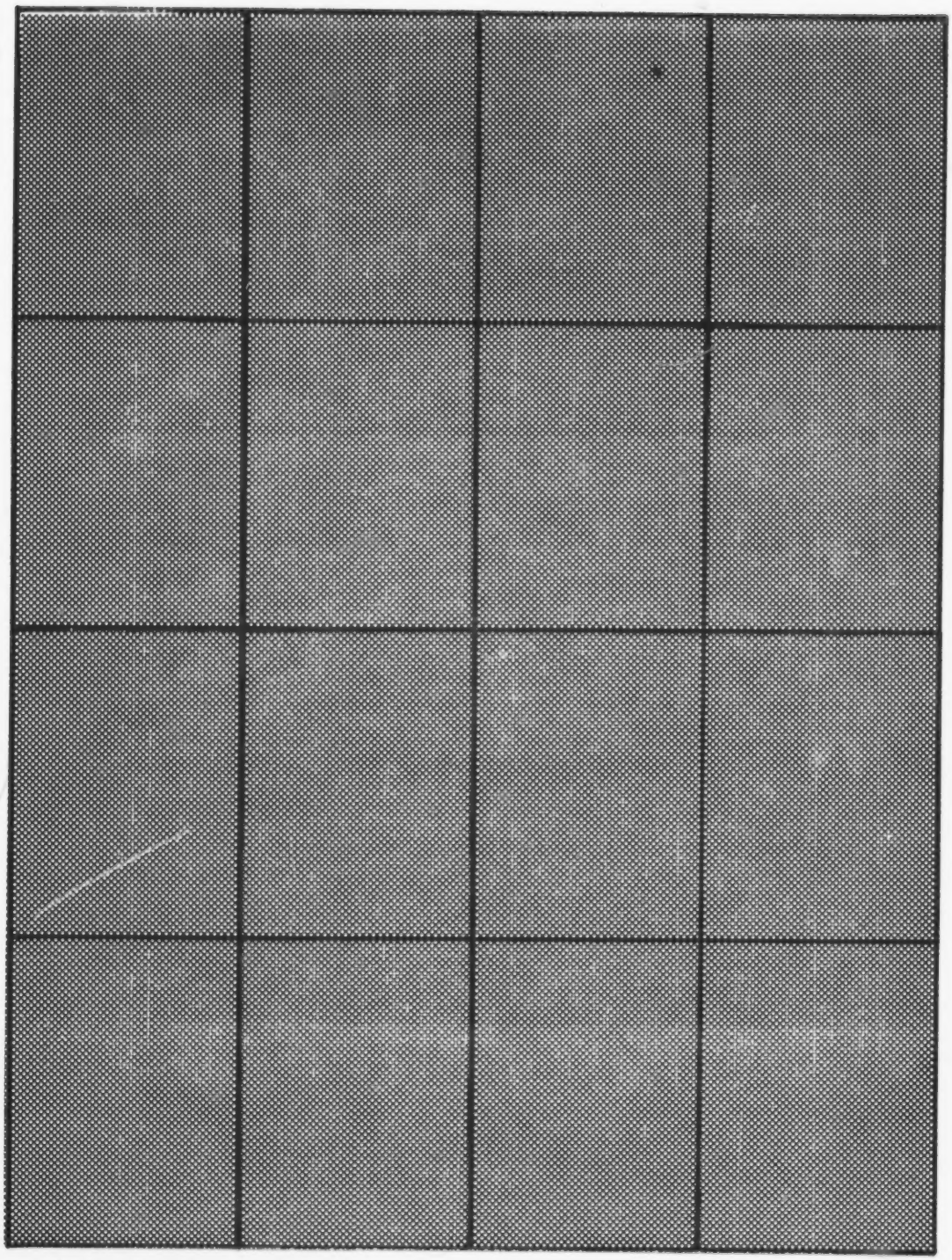
D



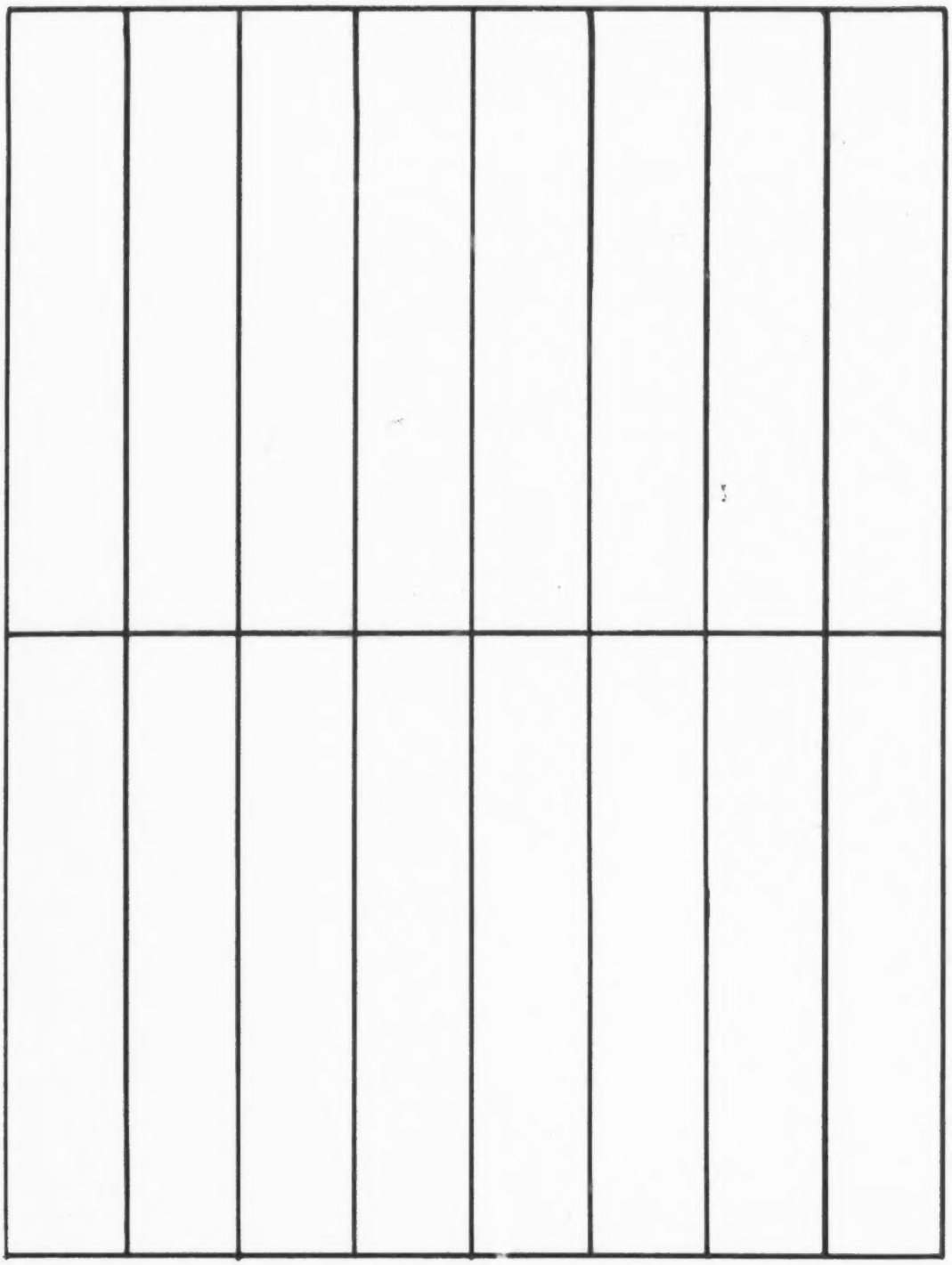


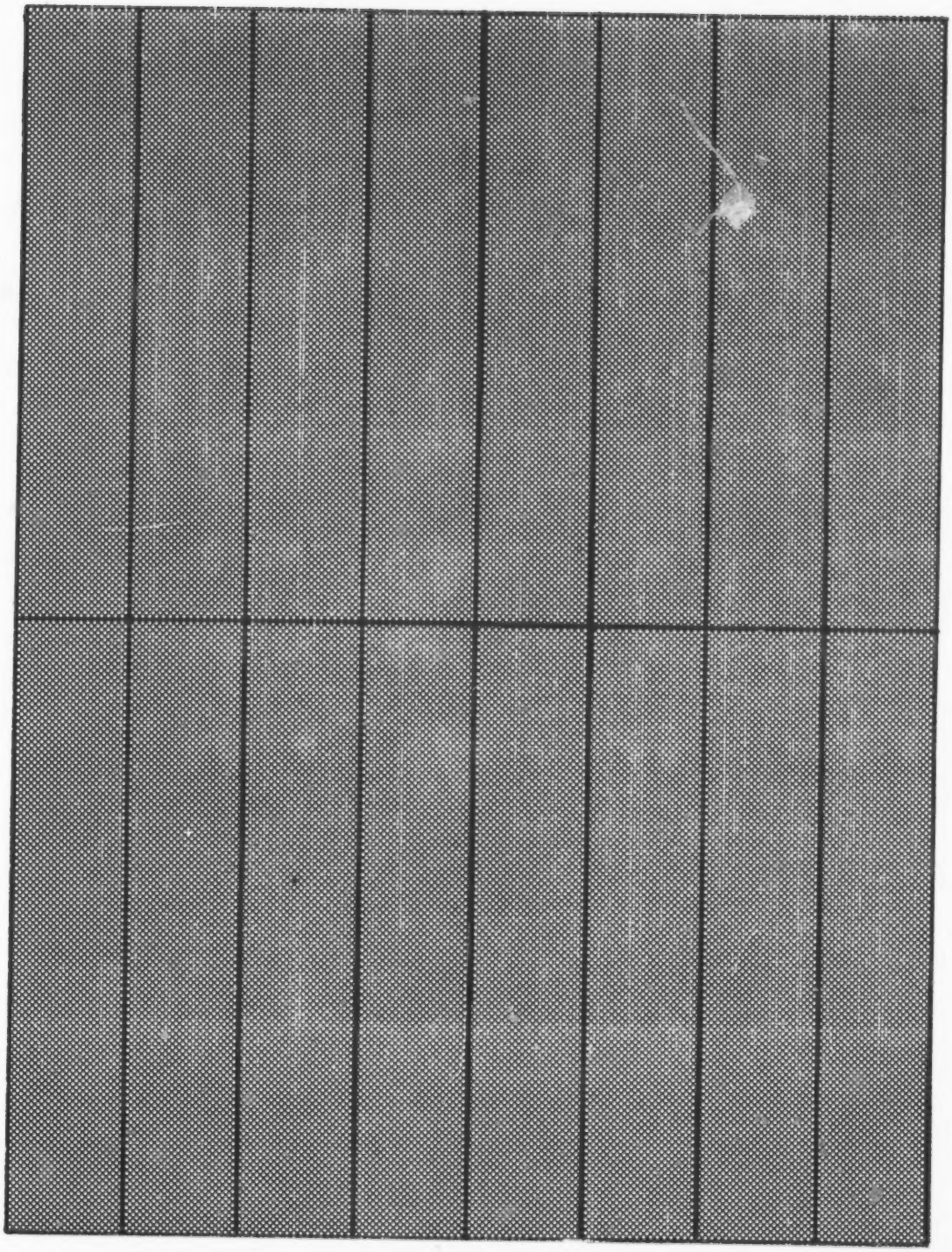
E





F





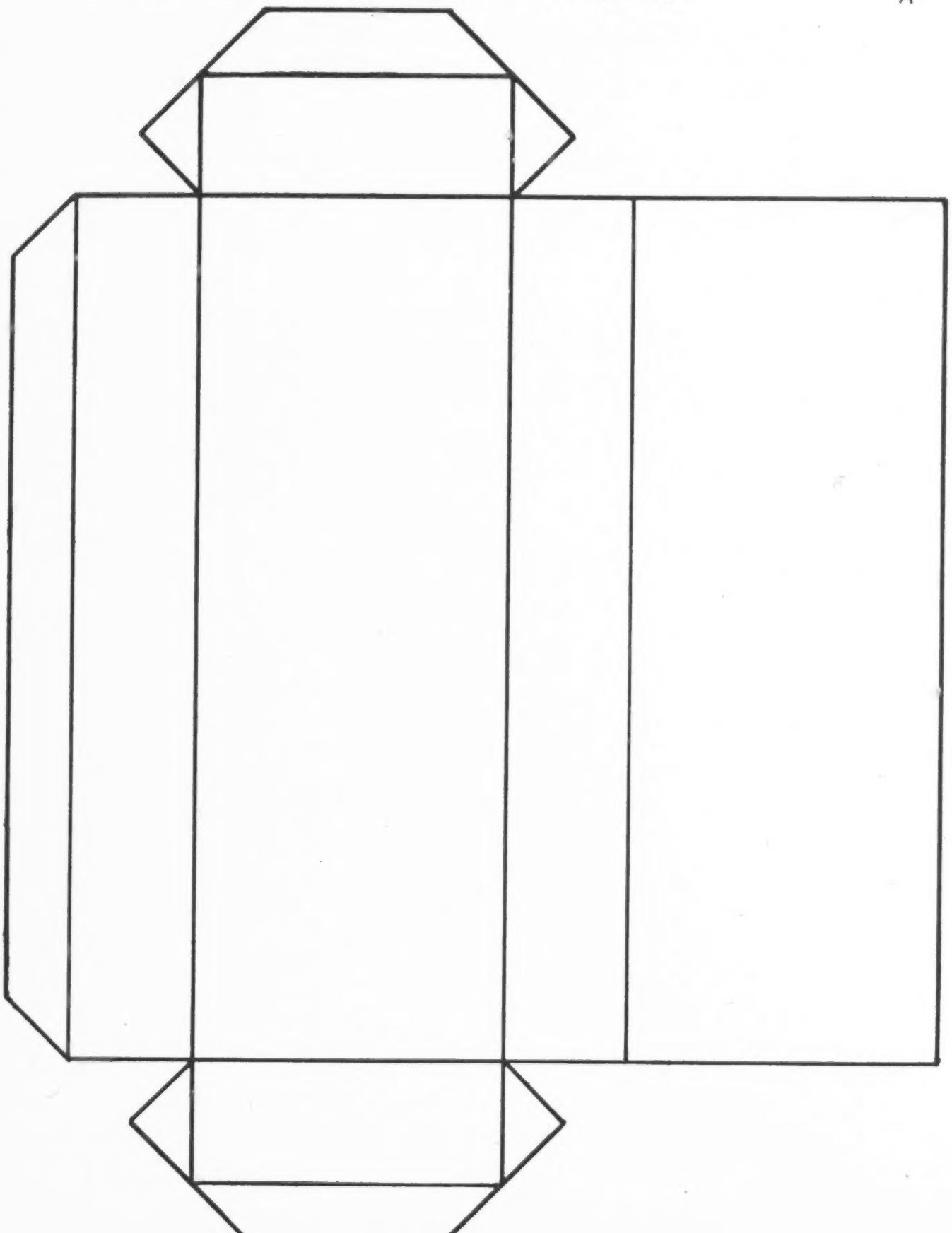
Three-Dimensional Developments

This section includes two developments, a rectangular box and a cube, which may be cut out, folded, and glued to provide the student with a three-dimensional object. These objects may be used in conjunction with teaching formulas.

NOTE: Before constructing the boxes, score the lines on the developments with a pencil or a ball-point pen. The box will then fold more easily and have more uniform edges.

Cut this figure out and fold on the lines to make a rectangular box.

A



B

Cut this figure out and fold on the lines to make a CUBE.